TOSHIBA
Leading Innovation

ESTÍA

HFC
R410A

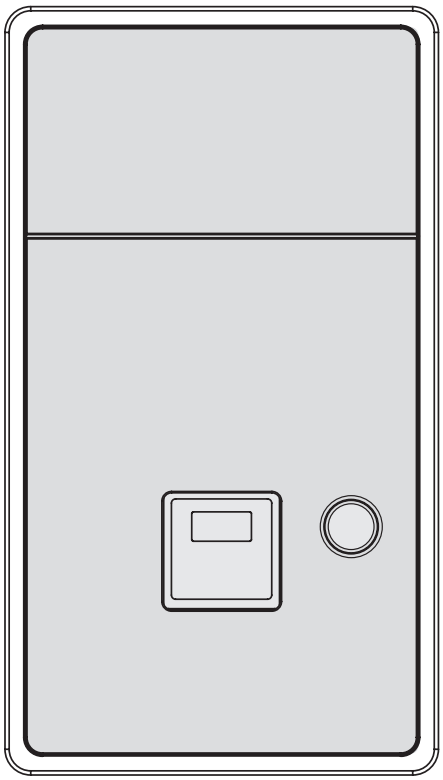
AIR TO WATER HEAT PUMP

Installation manual

Hydro Unit

Model name:

HWS-802XWHM3-E
HWS-802XWHT6-E
HWS-1402XWHM3-E
HWS-1402XWHT6-E
HWS-1402XWHT9-E



Installation manual Hydro Unit (Air to Water Heat Pump)	2	English
Manuel d'installation Unité hydroélectrique (Pompe à chaleur air/eau)	44	Français
Installations-handbuch Hydrogerät (Luft-Wasser-Wärmepumpe)	86	Deutsch
Installationshandbok Hydroenhet (Luft-till-vatten-värmepump)	128	Svenska

Please read this Installation Manual carefully before installing the Air to Water Heat Pump.
- This Manual describes the installation method of the hydro unit.
- For installation of the outdoor unit, follow the Installation Manual attached to the outdoor unit.

ADOPTION OF NEW REFRIGERANT

This Air to Water Heat Pump is a new type which adopts a new refrigerant HFC (R410A) instead of the conventional refrigerant R22 in order to prevent destruction of the ozone layer.

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1 GENERAL INFORMATION

■ Hydro Unit Description

Hydro Unit	Model Description
HWS-802XWHM3-E	8 kW Hydro Unit (3 kW 230 V ~ back up heater)
HWS-802XWHT6-E	8 kW Hydro Unit (6 kW 400 V 3N ~ back up heater)
HWS-1402XWHM3-E	11 & 14 kW Hydro Unit (3 kW 230 V ~ back up heater)
HWS-1402XWHT6-E	11 & 14 kW Hydro Unit (6 kW 400 V 3N ~ back up heater)
HWS-1402XWHT9-E	11 & 14 kW Hydro Unit (9 kW 400 V 3N ~ back up heater)

■ General Specifications

Outdoor unit			HWS-802H-E	HWS-1102H-E	HWS-1402H-E
Type			Inverter		
Function			Heating & Cooling		
Heating	Capacity	(kW)	8.0	11.2	14.0
	Input	(kW)	1.96	2.40	3.15
	COP		4.08	4.66	4.45
Cooling	Capacity	(kW)	6.0	10.0	11.0
	Input	(kW)	2.13	3.52	4.08
	EER		2.82	2.84	2.69
Power supply			230 V ~		
Refrigerant			R410A		
Dimension	HxWxD	(mm)	890 x 900 x 320	1,340 x 900 x 320	

Hydro Unit			HWS-802XWHM3-E	HWS-802XWHT6-E	HWS-1402XWHM3-E	HWS-1402XWHT6-E	HWS-1402XWHT9-E
Back up heater capacity			3 kW	6 kW	3 kW	6 kW	9 kW
Power supply	for backup heater		230 V ~	400 V 3N ~	230 V ~	400 V 3N ~	400 V 3N ~
	for hot water cylinder heater(option)		230 V ~				
Leaving water temperature	Heating	(°C)	20 to 55				
	Cooling	(°C)	10 to 30				
For use with			HWS-802H-E		HWS-1102H-E/HWS-1402H-E		
Dimension	HxWxD	(mm)	925 x 525 x 355				

Hot water cylinder (option)		HWS-1501CSHM3-E HWS-1501CSHM3-UK	HWS-2101CSHM3-E HWS-2101CSHM3-UK	HWS-3001CSHM3-E HWS-3001CSHM3-UK
Water volume	litres	150	210	300
Max water temperature	(°C)	75		
Electric heater	(kW)	2.75 (230 V ~)		
Height	(mm)	1,090	1,474	2,040
Diameter	(mm)	550		
Material		Stainless steel		

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2 ACCESSORY PARTS

No	Parts name	Quantity	No	Parts name	Quantity
1	Installation manual (this document)	1	3	Insulator for cooling	1
2	Owner's manual	1			

3 PREPARATIONS FOR INSTALLATION

■ Parts required to connect this product (Common items)

Category	Part	Specification	Quantity
Water piping	Strainer (water filter)	1 1/4" 30 to 40 meshes	1
	Drain cock	(for water charge)	1
	Isolating ball valves	1 1/4" for service 1 1/4"	2
Electrical system	Earth leakage breaker for main power supply	30 mA	1
	Earth leakage breaker for backup heater	30 mA	1
	(Option) Earth leakage breaker for hot water cylinder heater	30 mA	1

■ Options required for each function

Purpose	In the Hydro Unit		Purchased part	
	Part name	Model name	Part name	Prescribed specification
Heating	–	–	Radiator(s), Fan coil(s), Under floor heating	
Heating &Cooling (all rooms)	–	–	Fan coil(s)	
Heating & Cooling (partly heating only)	–	–	Motorized 2-way valve (for cooling)	Refer to "Control parts specifications" on page 23.
Hot water supply	Hot water cylinder		Motorized 3-way valve Earth leakage breaker	Refer to "Control parts specifications" on page 23.
	150 L	HWS-1501CSHM3-E		
		HWS-1501CSHM3-UK		
	210 L	HWS-2101CSHM3-E		
		HWS-2101CSHM3-UK		
	300 L	HWS-3001CSHM3-E		
		HWS-3001CSHM3-UK		
2-zone control	–	–	Motorized mixing valve	Refer to "Control parts specifications" on page 23.
			Circulator pump	Other power supply
			Buffer tank	
Interlocking with boiler	Output control board kit (1)	TBC-PCIN3E	Boiler	Other power supply Signal 12 V input function is required for boiler.
Interlocking with booster heater	Output control board kit (1)	TBC-PCIN3E	Electric heater	Other power supply. Signal 230 V input function is required for booster heater

■ Optional Parts

No.	Part name	Model name	Application	Remarks
1	External output board	TCB-PCIN3E	Boiler-linked output, Alarm output	Up to two boards (according to applications)
			Defrost signal output, operation signal output	
2	External input board	TCB-PCMO3E	Cooling/heating thermostat input	Up to two boards (according to applications)
			Forced-stop signal input	

Use specified products for the outdoor unit, Hydro Unit, and hot water cylinder.
Do not use commercially available products.
Use parts that conform to prescribed specifications for parts to be connected to the Hydro Unit.
If unspecified products or parts are used, a malfunction, failure or fire may be caused.

4 PRECAUTIONS FOR SAFETY

■ General Safety Precautions

Ensure that all Local, National and International regulations are satisfied.

- Read the “PRECAUTIONS FOR SAFETY” carefully before installation.
- The precautions described below include the important items regarding safety – Observe them without fail.
- After the installation work has been completed, perform a trial operation to check for any problems. Follow the Owner’s Manual to explain how to use and maintain the unit to the customer.
- Turn off the main power supply switch (or breaker) before unit maintenance.
- Ask the customer to keep the Installation Manual along with the Owner’s Manual.

■ Refrigerant Precautions

- If a refrigerant leak is suspected contact the dealer who supplied the system, in the case of a recharge of refrigerant ask service personnel for details of the leak and confirmation of the repairs completed.
  The refrigerant used in the system is harmless.
- Generally the refrigerant does not leak, however, if the refrigerant should leak into a room and a heater or stove burner in the room is lit, toxic gas may be generated.
- Do not install the system in a location subject to a risk of exposure to a combustible gas.
  If a combustible gas leaks and stays around the unit a fire may occur.
- Install the refrigerant pipe securely during installation and before operation.
  If the compressor is operated with no pipe work connected and valves open the compressor will suck air which would result in over pressurization of the system which may result in bursting or injury.
  Observe the same precautions for refrigerant recovery work (pump back procedure to outdoor unit) and do not disconnect pipe work until refrigerant is recovered and valves closed.

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⚠ WARNING

Installation Precautions

- Ask an authorized dealer or qualified installation professional to install/maintain the Air to Water Heat Pump System.
  Inappropriate installation may result in water leaks, electric shock or fire.
- Electrical work must be performed by a qualified electrician in accordance with the installation manual.
  An inappropriate power supply capacity or installation may result in fire.
- When completing any electrical works to the system ensure that all Local, National and International regulations are satisfied.
  Inappropriate grounding may result in electric shock.
- Use the specified electrical cables, fixing securely at all terminations.
- Earth wire connections.
- Install an earth leakage breaker without fail.
  Incomplete grounding can cause electric shock.
  Do not ground wires to gas pipes, water pipes, lightning rods or telephone cable ground wires.
- This unit must be connected to the main power supply using a circuit breaker or switch with a contact separation of at least 3 mm.
- Be sure to turn off all main power supply switches or the circuit breaker before starting any electrical work.
  Ensure all power switches are off, failure to do so can cause electric shock.
  Use an exclusive power circuit for the Air to Water Heat Pump system using the rated voltage.
- Ensure correct connection of interconnecting wire between Outdoor Unit and Hydro Unit.
  Incorrect connection of the interconnecting cable may result in the damage of electrical parts.
- Ensure refrigeration system remains sealed to external gases and air.
  Should air or other gases contaminate the refrigeration circuit, high system pressures could result in burst pipes and injuries.
- Do not modify or bypass any of safety guards or switches in this system.
- After unpacking the outdoor unit, examine the unit carefully for any possible damage.
- Do not install in any place that might increase the vibration of the unit.
- To avoid personal injury (with sharp edges), be careful when handling parts.
- Perform installation work properly in accordance with the installation manual.
  Inappropriate installation may result in water leaks, electric shock or fire.
- Tighten all flare nuts with a torque wrench in the specified manner.
  Excessive tightening of the flare nut may result in cracking of the pipe work or flare nut which may result in a refrigerant leakage.
- Wear heavy duty gloves during installation work to avoid injury.
- Install the outdoor unit securely in a location where the base can sustain the weight adequately.
- In enclosed areas, if the refrigerant leaks during installation vacate and ventilate immediately.
- After installation is complete ensure and confirm that refrigerant does not leak.
  If refrigerant leaks into a room and flows near a fire source noxious gas may be generated.
- Do not block any drain hoses. Hoses may come off and electric shocks may occur.
- Do not hit the manometer, because it is made of glass. It is breakable.

■ Notes on System Design

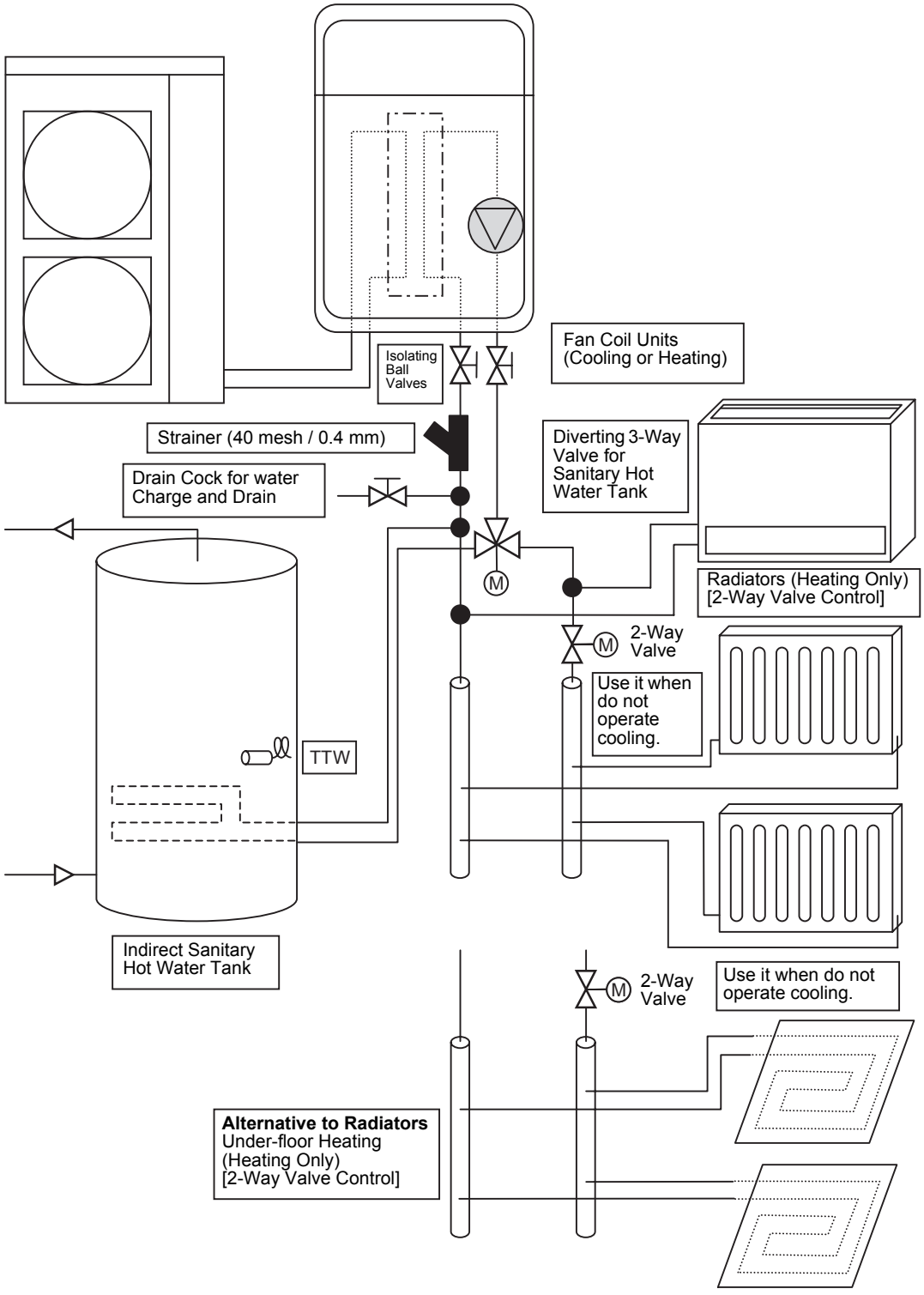
- The input water temperature to the Hydro Unit must be 55°C or less.
  Especially, be careful when there is an external heating source such as a boiler.
  When hot water over 55°C returns, it may result in a failure of the unit or water leakage.
- The flow rate of the circulating water must meet the following range.
  11 and 14 kW 18 L/minute or more
  8 kW 13 L/minute or more
  If the flow rate becomes less than the minimum, the protective device is activated to stop operation.
  Ensure the flow rate with a bypass valve, etc. when you use a flow rate valve for the Hydro Unit.
- Do not drive water by power other than the pump built in the Hydro Unit.
- The backup heater operates supplementarily to exert a prescribed capacity when the heat pump cannot exert its capacity at a low outside temperature.
- Install the Hydro Unit and water pipes in a place in which they do not freeze.
- Make the water circuit closed. Never use it as an open circuit.
- Circulating water must be 20 liters or more. If total water amount is not enough, the unit may not function fully due to protective operation.

5 EXAMPLE OF HYDRO UNIT INSTALLATION

■ Example of Installation for Cooling and Heating

When both cooling and heating are used, install a 2-way valve (for cooling) to the pipe to the room for heating only.

▼ Fig. 5-01



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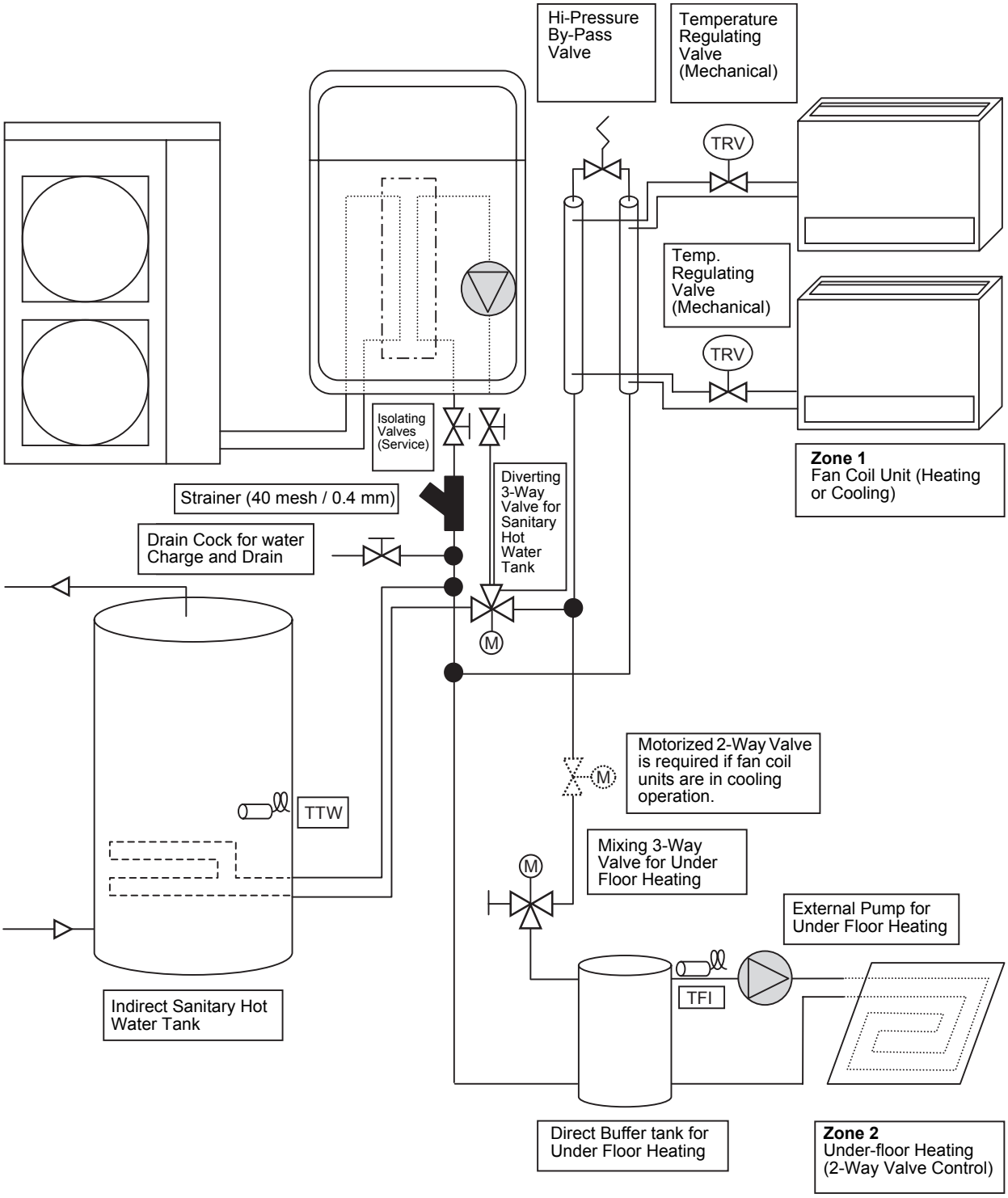
■ Example of 2-Zone Temperature Control and Hot Water Supply System

The following shows an example of the 2-zone temperature control.
A buffer tank and a water pump are required for the 2-zone temperature control.

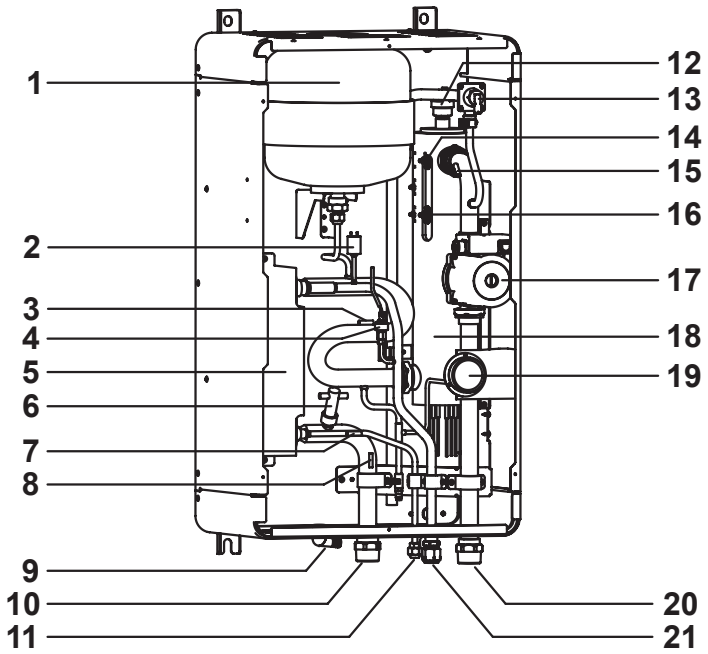
▼ Fig. 5-02


Hi-Pressure By-Pass Valve
Temperature Regulating Valve (Mechanical)
TRV
Temp. Regulating Valve (Mechanical)
TRV
Isolating Valves (Service)
Zone 1
Fan Coil Unit (Heating or Cooling)
Strainer (40 mesh / 0.4 mm)
Diverting 3-Way Valve for Sanitary Hot Water Tank
Drain Cock for water Charge and Drain
M
Motorized 2-Way Valve is required if fan coil units are in cooling operation.
M
TTW
Mixing 3-Way Valve for Under Floor Heating
M
External Pump for Under Floor Heating
TFI
Indirect Sanitary Hot Water Tank
Direct Buffer tank for Under Floor Heating
Zone 2
Under-floor Heating (2-Way Valve Control)

6 MAIN COMPONENTS OF HYDRO UNIT

■ Exploded view and description for Hydro Unit

▼ Fig. 6-01



1 : Expansion vessel
2 : Hi pressure switch (4.15 MPa)
3 : Temperature sensor (for Heat pump outlet -TWO)
4 : Pressure sensor
5 : Heat exchanger
6 : Flow switch (13.0 L/min 17.5 L/min)
7 : Temperature sensor (for refrigerant -TC)
8 : Temperature sensor (for water inlet -TWI)
9 : Drain nipple
10 : Water inlet connection
11 : Refrigerant liquid connection
12 : Air relief valve
13 : Pressure relief valve (0.3 MPa (3 bar))
14 : Thermal protector (auto)
15 : Temperature sensor (for water outlet THO)
16 : Thermal protector (Single operation)
17 : Water pump
18 : Backup heater (3 kW, 3 kW x 2, 3 kW x 3)
19 : Manometer
20 : Water outlet connection
21 : Refrigerant gas connection

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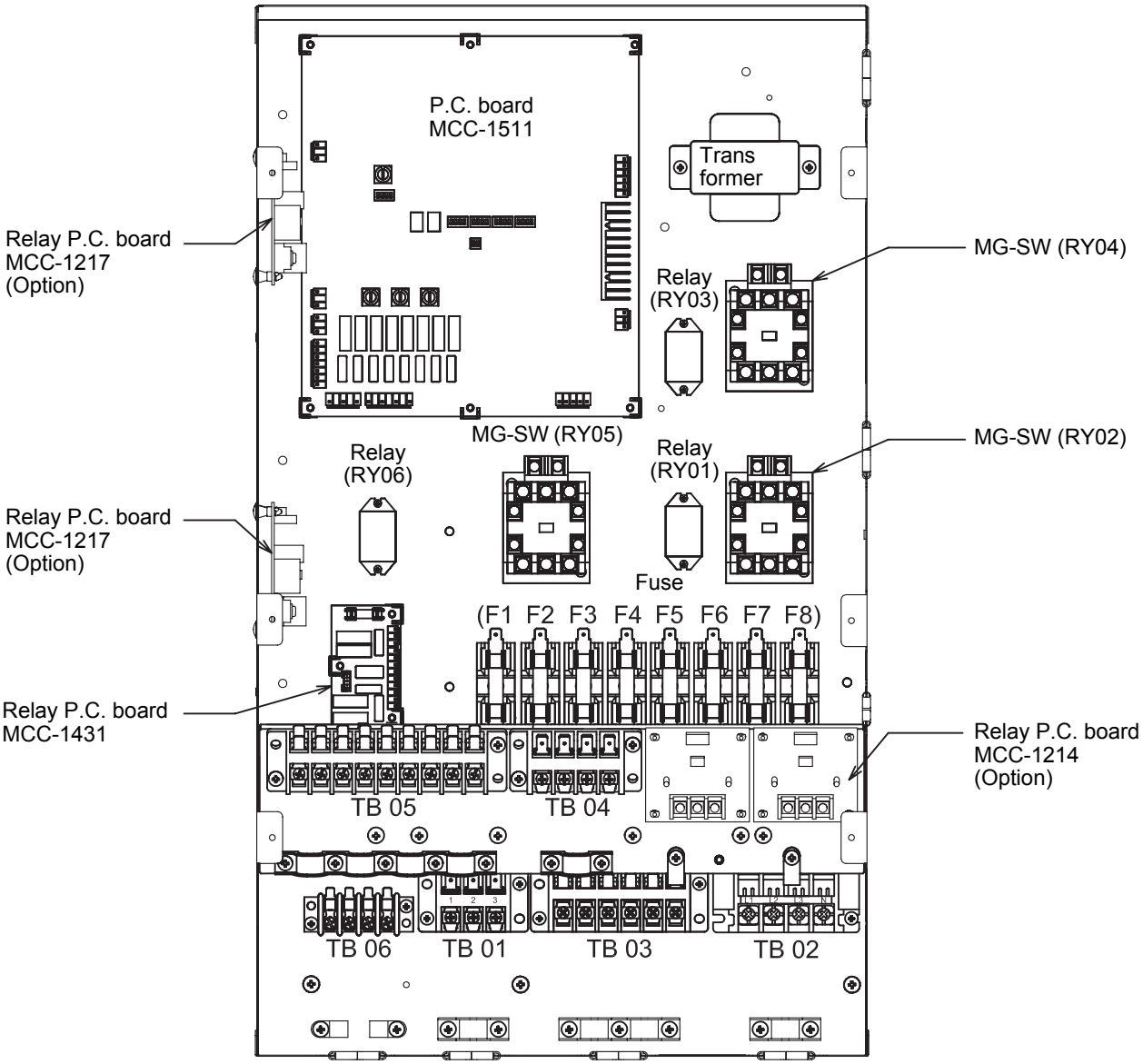
■ E-Box layout

▼ **Fig. 6-02**



7 HYDRO UNIT INSTALLATION

⚠ WARNING

- To protect yourself from injury, always use PPE (Personal Protective Equipment), that is, wear gloves.
- Install the Hydro Unit by at least two persons.
- Install the Hydro Unit in a place strong enough to withstand the following weights:
  Hydro Unit weight with no water 60 kg (802) 65 kg (1402)
  Hydro Unit weight with full water 80 kg (802) 85 kg (1402)

⚠ CAUTION

- The operating temperature range is 5 to 32°C (Heating) and 18 to 30°C (Cooling).
  Do not install the unit in a place where water freezes.
- Do not install the Hydro Unit in a place where combustible gas may leak.
- Do not install the Hydro Unit in a place exposed to rain or water.
- Do not install the Hydro Unit near equipment which generates heat.
- Do not install the Hydro Unit to a movable object.
- Do not install the Hydro Unit in a place exposed to vibration.

■ Handling, Unpacking, and Checking the Hydro Unit

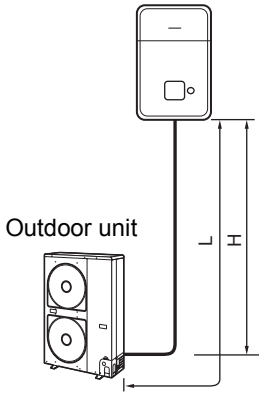
- The unit should be checked when it is delivered, and any damage reported immediately to the courier claims the department.

■ Positioning

Refrigeration pipe

The length and height of the refrigeration pipe must be within the following values.
As long as the Hydro Unit is installed within these ranges, no additional refrigerant is required.

▼ Fig. 7-01



H: Max. ±30 m (above or below)
L: Max. 30 m
  Min. HWS-802H-E : 5 m
  HWS-1102H-E : 3 m
  HWS-1402H-E : 3 m

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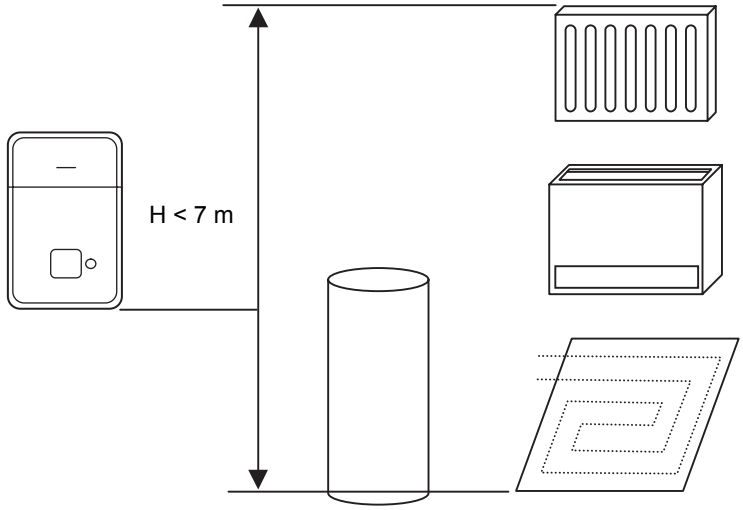
Water pipe

Design the water pipe length within the QH characteristics of the pump (Refe to “Fig. 7-16” and “Fig. 7-17” on page 19).
The height of the pipe must be 7 m or less.

▼ **Fig. 7-02**

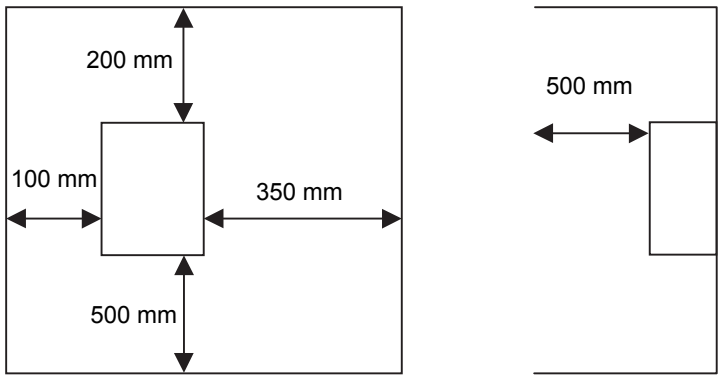


Service space

Secure a service space for the Hydro Unit.

- Do not install the Hydro Unit in a place where heat stagnates.

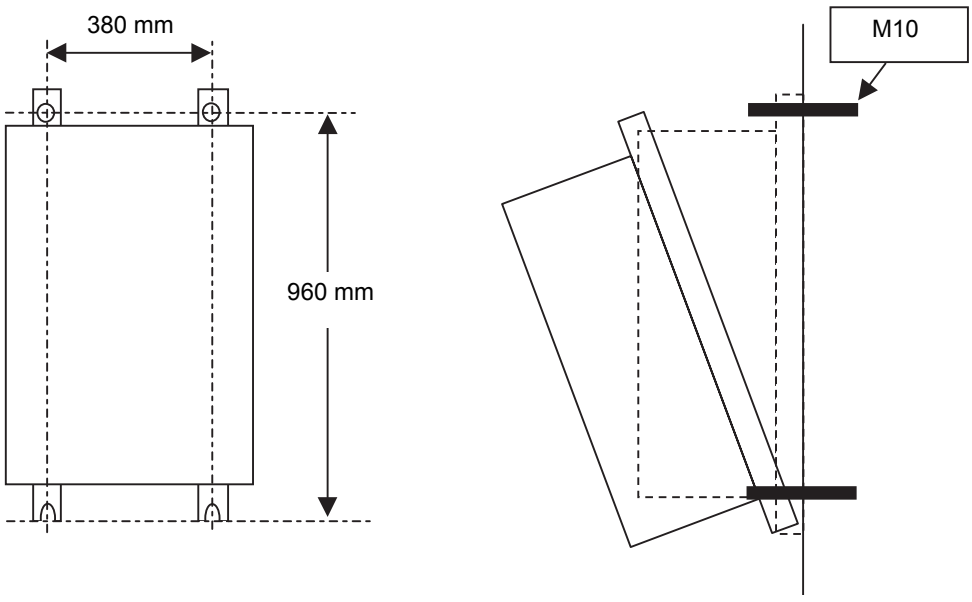
▼ **Fig. 7-03**



Mounting

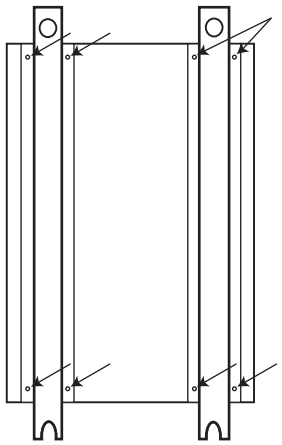
Install M10 bolts at the positions shown below and secure them with nuts.

▼ **Fig. 7-04**



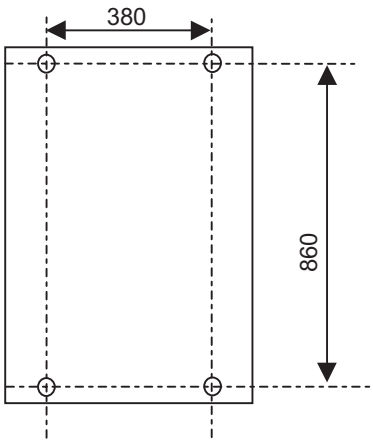
The Hydro Unit can be installed directly without using the fixing angles.
However, the back side of the Hydro Unit can be highly heated, therefore, the installing surface must be heat-resistant.

▼ Fig. 7-05

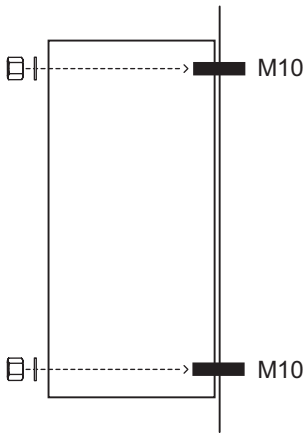


Remove the M5a screws to detach the fixing angles.

▼ Fig. 7-06



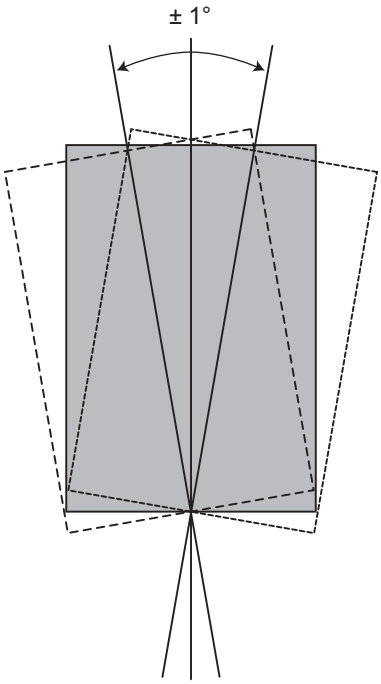
▼ Fig. 7-07



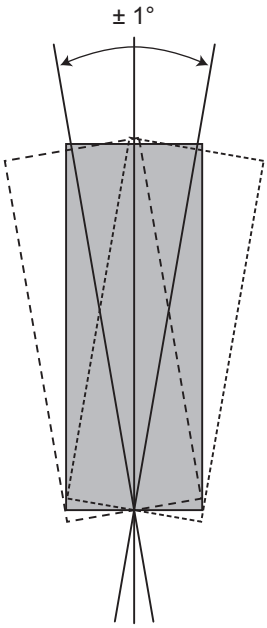
Secure the Hydro Unit with plain washers and nuts.

Install the Hydro Unit so that its tilting angle falls within the range below.

▼ Fig. 7-08



▼ Fig. 7-09



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■ Refrigerant Piping

⚠ WARNING

- THIS SYSTEM ADOPTS HFC REFRIGERANT (R410A) WHICH DOES NOT DESTROY THE OZONE LAYER.
- The characteristics of R410A refrigerant are: ease to absorb water, oxidizing membrane or oil, and its pressure is approximately 1.6 times higher that of R22. Accompanied with the new refrigerant the oil has also been changed. Therefore during installation work prevention of the invasion of water, dust, former refrigerant or oil is of a paramount importance.
  To prevent the charging of incorrect refrigerants into the system the service valve connection ports have also increased in size.
- The use of R410A tools is required for correct installation of the system.
- The use of the correct pipe sizes and wall thicknesses of copper pipe work is required for the correct installation of the system.

⚠ CAUTION

- Ensure all refrigerant pipes are protected from the invasion of dust and water.
- Ensure all pipe work connections are tightened to the required torque settings detailed in this section.
- Perform an air tight using Oxygen Free Nitrogen (OFN) only.
- Evacuate the air in the pipe work using a vacuum pump.
- Check for refrigerant gas leaks at all connections throughout the pipe work.

NOTE

The Air to Water Heat Pump system uses R410A refrigerant. It is important that copper pipes used for refrigerant piping have the following wall thickness:

- 0.8 mm for Ø6.4 mm, Ø9.5 mm and Ø12.7 mm
- 1.0 mm for Ø15.9 mm

Refrigerant pipe sizes

Hydro Unit Model	Gas Side (mm)	Liquid Side (mm)
8 kW Hydro Unit	Ø 15.88	Ø 9.52
11 & 14 kW Hydro Unit	Ø 15.88	Ø 9.52

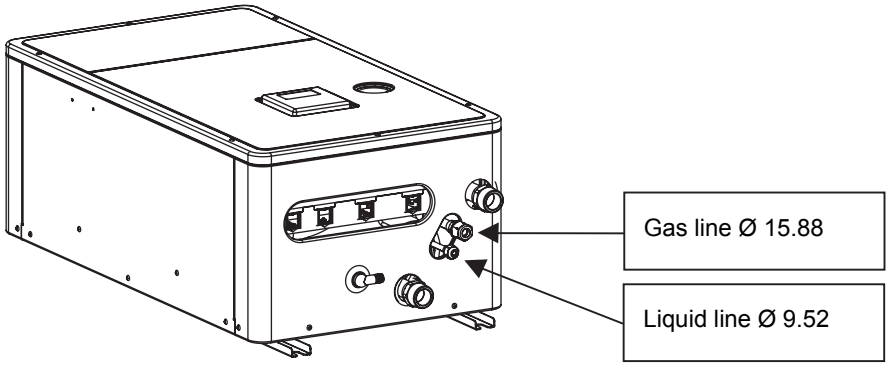
Flaring

- Cut the refrigerant pipes to the correct length using a pipe cutter. Remove any burrs that may be on the pipes as these may cause refrigerant leaks or component failure in the refrigeration cycle.
- Place the correct size flare nuts onto the pipes (use the flare nuts supplied with the Hydro Unit or use flare nuts designed specifically for R410A refrigerant) and then flare the pipes using the correct flaring tool.

Tightening

- Connect the refrigerant pipes, from the outdoor unit, to the Hydro Unit as shown below.

▼ **Fig. 7-10**



- Align the flare connection on each pipe with the corresponding outlet connection on the Hydro Unit. Tighten the flare nuts, using fingers, to secure the pipes in place.
- Tighten the flare nuts, using a torque wrench, to the tightening torques shown below:

Outer Ø of Copper Pipe (mm)	Tightening Torque (N/m)
9.5	33 to 42
15.9	63 to 77

- To prevent damage, to the refrigerant pipes, use two spanners to tighten the flare nut connections to the required torque.

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■ Water Pipe

⚠ WARNING

- Install water pipes according to the regulations of respective countries.
- Install water pipes in a freeze-free place.
- Make sure that water pipes have sufficient pressure resistance.
  The setting value of the pressure relief valve is 0.3 MPa.

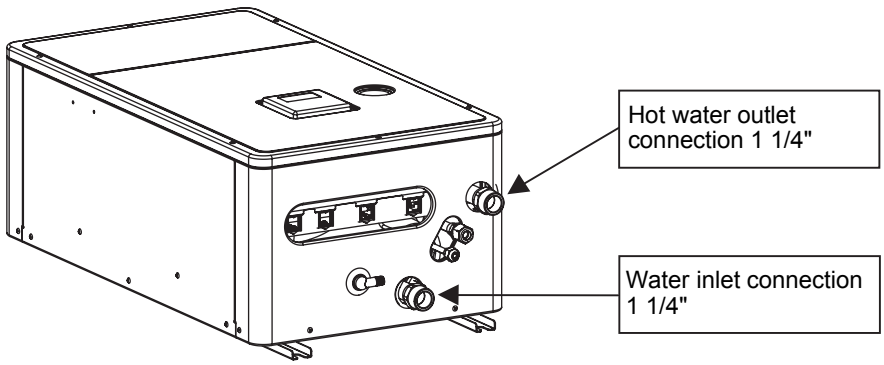
⚠ CAUTION

- Do not use zinc plated water pipes. When steel pipes are used, insulate both ends of the pipes.
- The water to be used must meet the water quality standard specified in EN directive 98/83 EC.

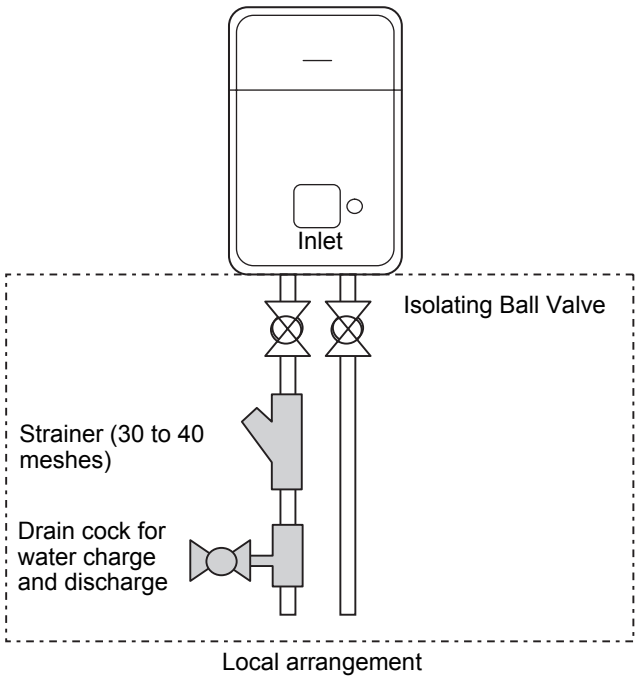
Water circuit

- Install a strainer with 30 to 40 meshes (procured locally) at the water inlet of the Hydro Unit.
- Install drain cocks (procured locally) for water charge and discharge at the lower part of the Hydro Unit.
- Make the piping route a closed circuit. (An open water circuit may cause a failure.)

▼ **Fig. 7-11**



▼ **Fig. 7-12**

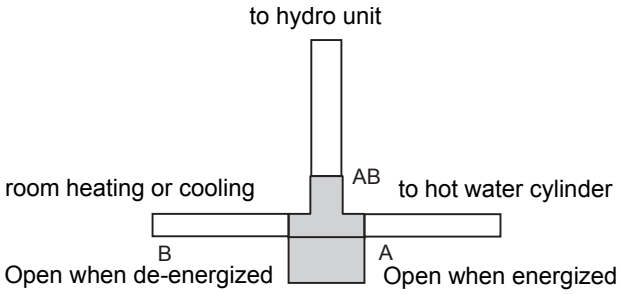


Local arrangement

Piping to hot water tank (option)

Water supplied to the hot water cylinder is branched by a motorized 3-way valve (procured locally).
For the specifications of the motorized 3-way valve, refer to “Control parts specifications” on page 23.
Connect the hot water cylinder to port A (open when energized) of the valve.

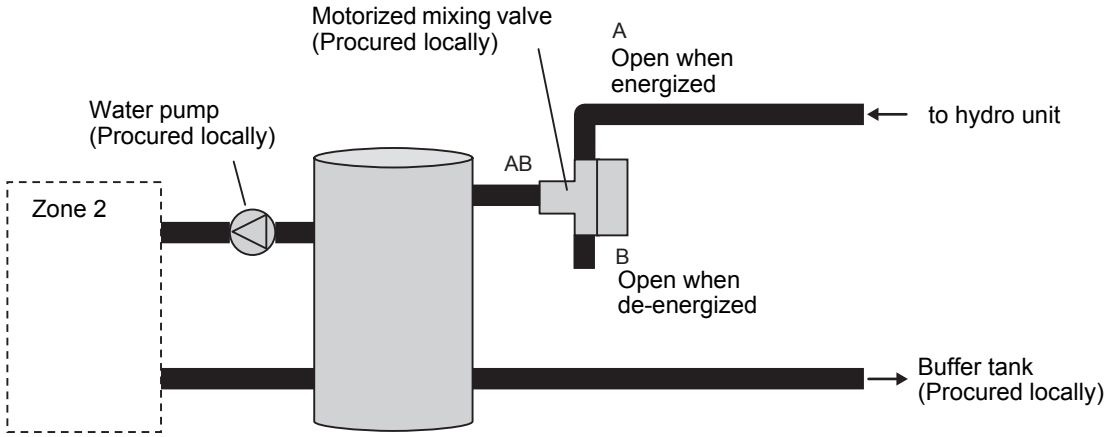
▼ **Fig. 7-13**



Piping to 2-zone operation

To perform 2-zone temperature control, circulate water by another pump (procured locally) through a motorized mixing valve (procured locally) and a buffer tank (procured locally).
For the specifications of the motorized mixing valve, Refer to “Control parts specifications” on page 23.

▼ **Fig. 7-14**



Checking water volume and initial pressure of expansion vessel

The expansion vessel of the Hydro Unit has a capacity of 12 liters.
The initial pressure of the expansion vessel is 0.1 MPa (1 bar).
The pressure of the safety valve is 0.3 MPa (3 bar).
Verify whether the capacity of the expansion vessel is sufficient using the following expression. If the volume is insufficient, add the capacity locally.

EN

Expression for expansion vessel selection

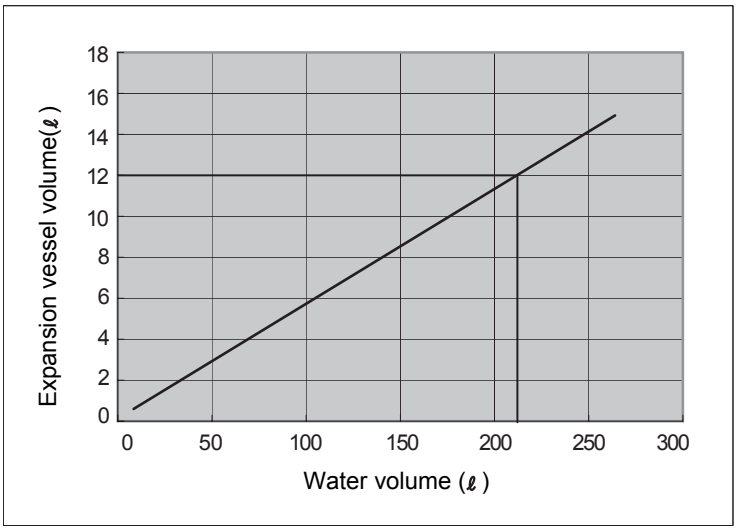
$$V = \frac{\varepsilon \times Vs}{1 - \frac{P1}{P2}}$$

V: Necessary total tank capacity (ℓ)
ε: Water expansion coefficient at average hot water temperature
Vs: Total water amount in the system
P1: System pressure at tank setting position (MPaabs.)
(Pipe inner pressure during pump operation before heating device operates = water supply pressure)
P2: Maximum pressure used during operation at tank setting position (MPaabs.)
(= safety valve setting pressure)
* The absolute pressure value (abs.) is obtained by adding the atmospheric pressure (0.1 MPa (1 bar)) to the gauge pressure.

▼ Tank selection method

Water temperature and expansion coefficient			
Hot water temperature (°C)	**Expansion rate ε**	**Hot water temperature (°C)**	**Expansion rate ε**
0	0.0002	50	0.0121
4	0.0000	55	0.0145
5	0.0000	60	0.0171
10	0.0003	65	0.0198
15	0.0008	70	0.0229
20	0.0017	75	0.0258
25	0.0029	80	0.0292
30	0.0043	85	0.0324
35	0.0050	90	0.0961
40	0.0078	95	0.0967
45	0.0100		

▼ Fig. 7-15

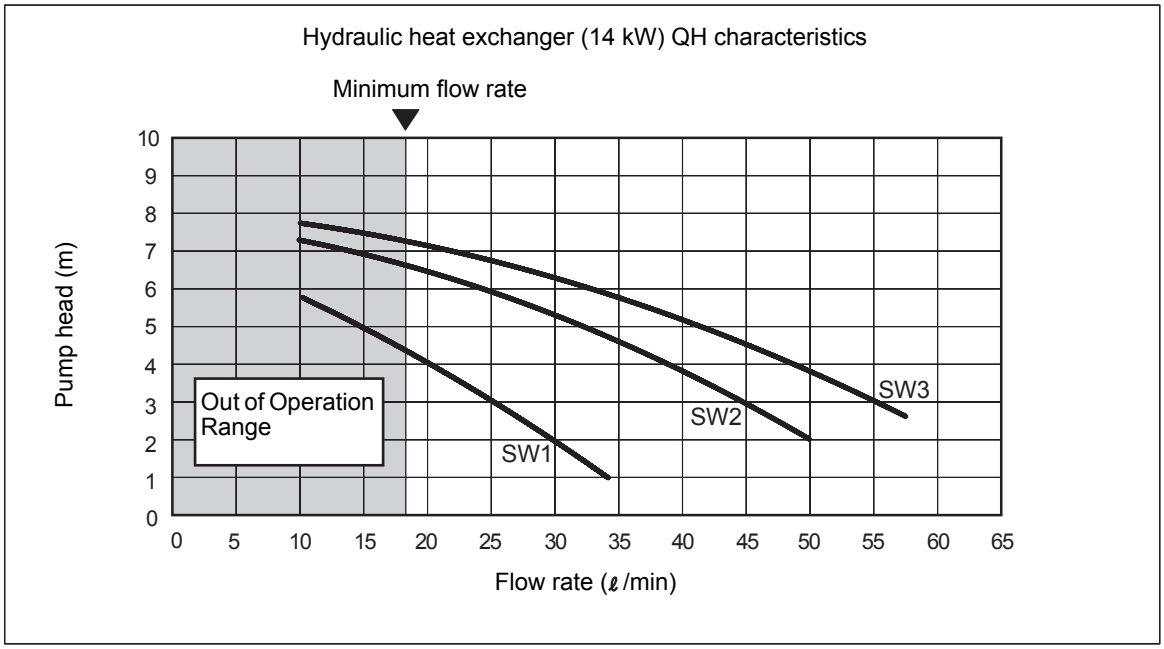


*Hot water temperature 55ºC

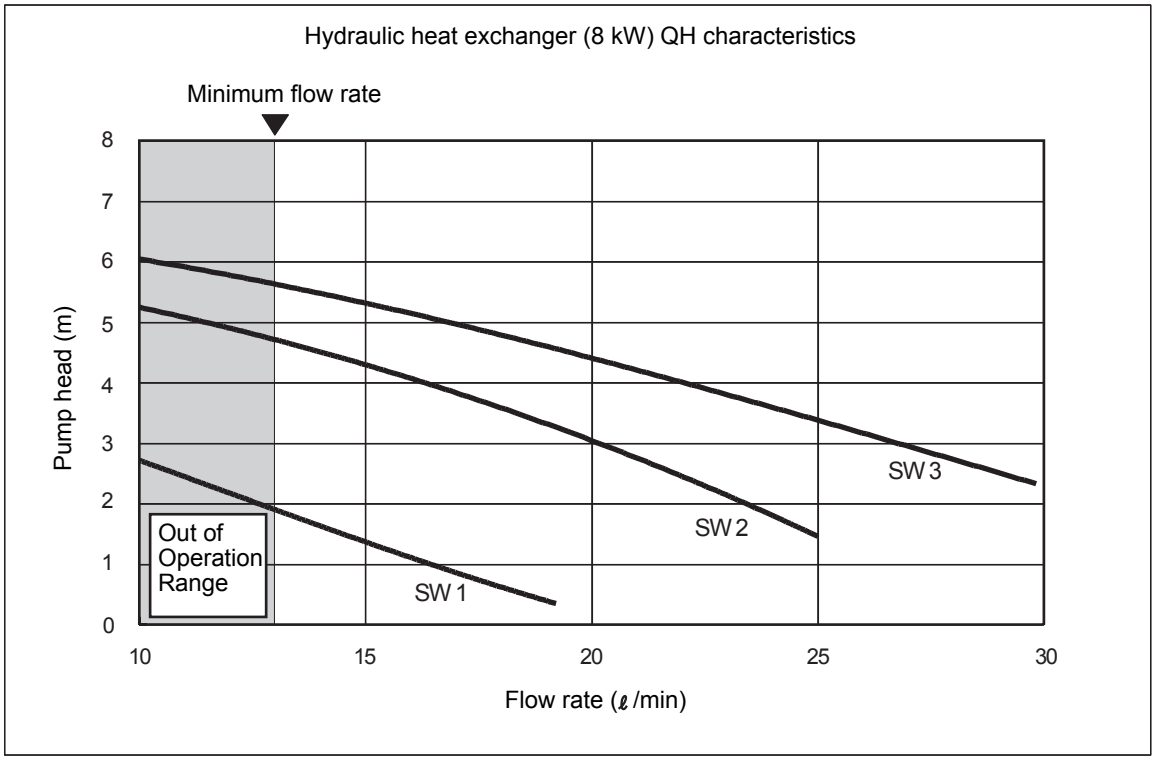
Install an external expansion vessel when the capacity of the expansion vessel is insufficient.

Pump operation/configuration

▼ **Fig. 7-16**



▼ **Fig. 7-17**



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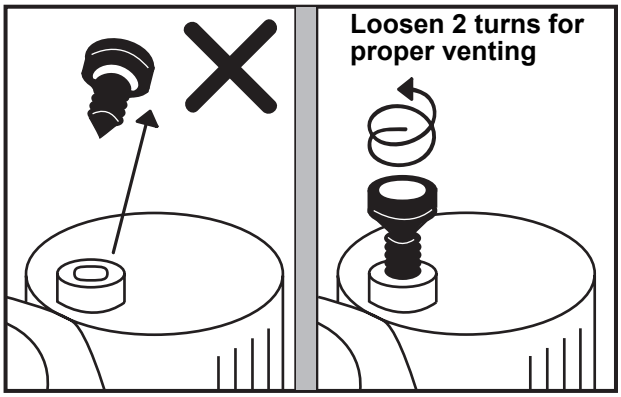
Water charging

Charge water until the pressure gauge shows 0.2 MPa (2 bar).
Hydraulic pressure may drop when the trial run begins. In that case, add water.
Air may enter if the charged hydraulic pressure is low.
Loosen the purge valve cap by two turns to release air.

▼ **Fig. 7-18**



Loosen the cap of the pressure relief valve to release air.
Water may come out of the pressure relief valve.
Release the air completely from the water circuit. Failure to do so may disable correct operation.

Water quality

The water used must satisfy EN directive 98/83 EC.

Piping insulation

It is recommended that insulation treatment be applied to all pipes. To perform optional cooling operation, apply insulation treatment of 20 t or more to all pipes.

■ Electrical Installation

⚠ WARNING

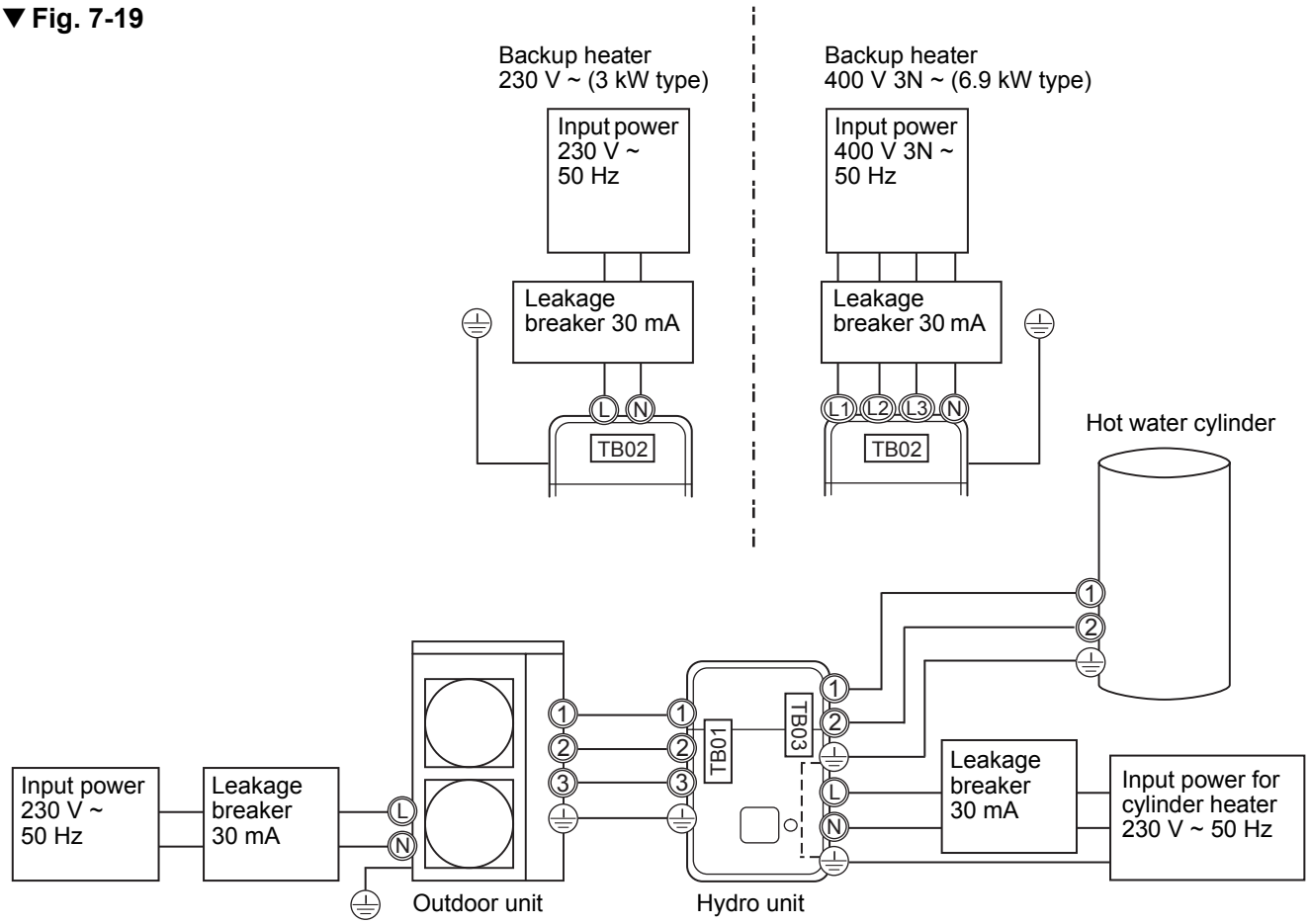
- Ensure electrical circuits are isolated before commencing the electrical installation.
- The electrical installation must be completed by a qualified electrician.
- The electrical installation must comply to all Local, National and International electrical installation regulations.
- This product must be earthed in accordance with Local, National and International electrical installation regulations.

⚠ CAUTION

- The Hydro Unit must be connected to a dedicated power supply for the back up heater circuit.
- The electrical supply must be protected by a suitably sized over current protection device (fuse, MCB etc) and an earth leakage protection device.
- The Hydro Unit must be connected to the mains power supply using a isolating switch which disconnects all poles and has a contact separation of at least 3 mm.
- The cord clamps, attached to the Hydro Unit, must be used to secure the electrical cables.
- Wrong connection of electrical cables may result in electrical component failure or fire.
- Ensure the electrical cables are sized in accordance with the installation instructions.

Power line

▼ **Fig. 7-19**



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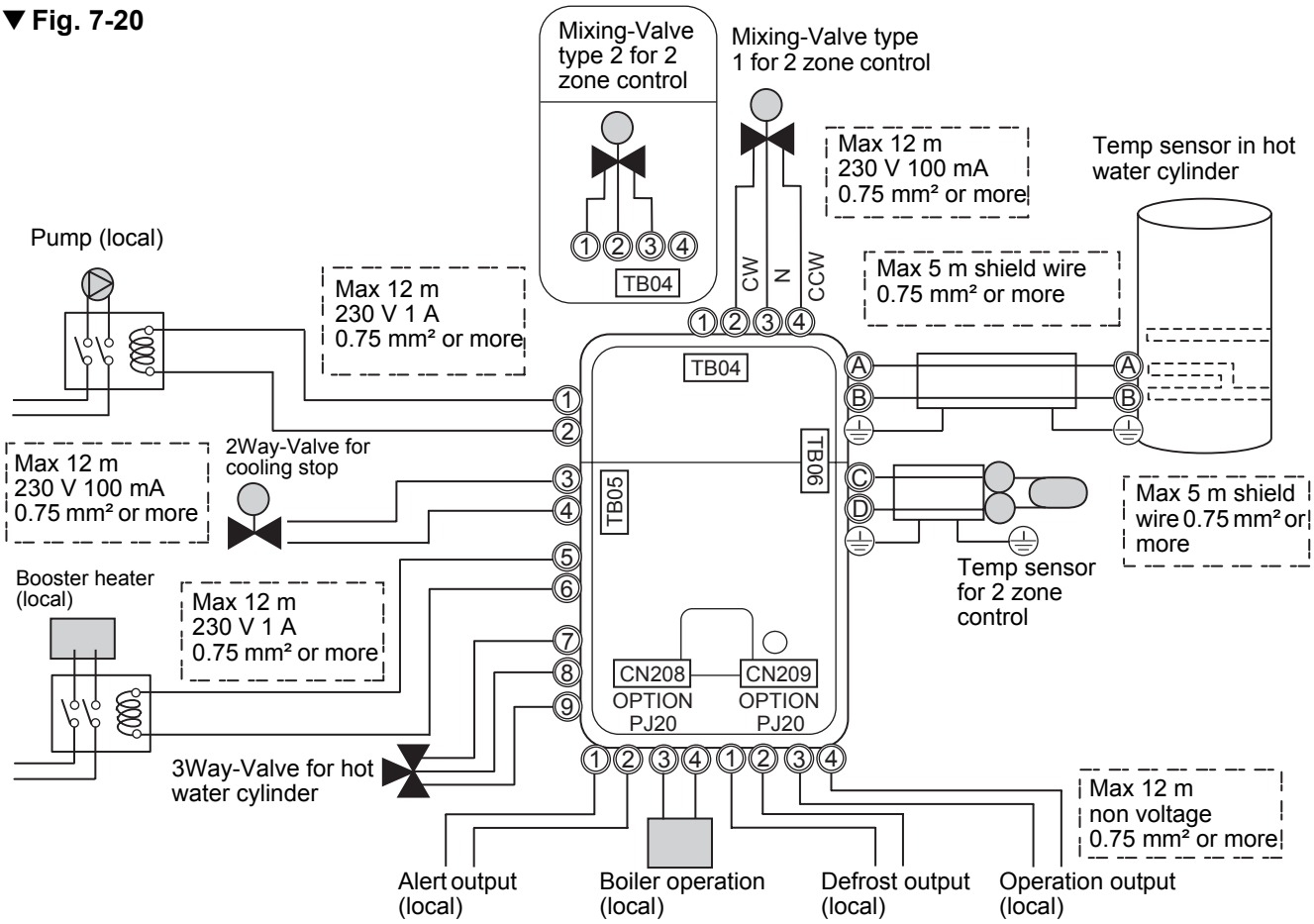
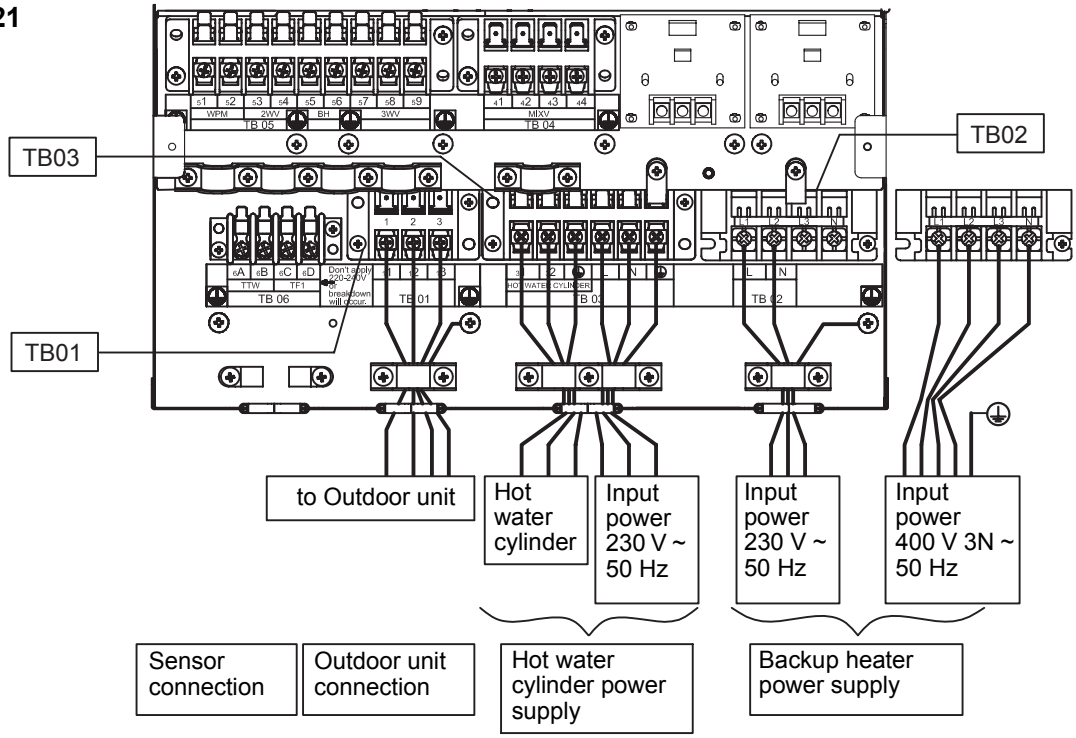
Control line

▼ Fig. 7-20



▼ Fig. 7-21



Electrical supply/cable specifications

▼ Wiring specifications

Description		POWER SUPPLY	Maximum current	Installation fuse rating	Power wire	Connection destination
Outdoor unit power	14 kW	230 V ~ 50 Hz	22.8 A	25 A	2.5 mm² or more	Ⓛ, Ⓝ
	11 kW	230 V ~ 50 Hz	22.8 A	25 A	2.5 mm² or more	
	8 kW	230 V ~ 50 Hz	20.8 A	25 A	2.5 mm² or more	
Outdoor-Hydro		–		–	1.5 mm² or more	①, ②, ③
Hydro inlet heater power	3 kW	230 V ~ 50 Hz	13 A	16 A	1.5 mm² or more	Ⓛ, Ⓝ (TB02)
	6 kW	400 V 3N ~ 50 Hz	15 A (13 A x 2P)	25 A	2.5 mm² or more	Ⓛ1, Ⓛ2, Ⓛ3, Ⓝ (TB02)
	9 kW	400 V 3N ~ 50 Hz	23 A (13 A x 3P)	25 A	2.5 mm² or more	
Hydro cylinder heater power		230 V ~ 50 Hz	12 A	16 A	1.5 mm² or more	Ⓛ, Ⓝ (TB03)
Hydro - cylinder		–	12 A	–	1.5 mm² or more	①, ② (TB03)

▼ Wiring specifications (control line)

Description	Line spec	Maximum current	Maximum length		Connection destination
3-way valve control	2 line or 3 line	100 mA	12 m	0.75 mm² or more	⑦, ⑧, ⑨ (TB05)
Mixing valve control	3 line	100 mA	12 m	0.75 mm² or more	①, ②, ③ or ②, ③, ④ (TB04)
2-zone thermo sensor	2 line	100 mA	5 m	0.75 mm² or more	Ⓒ, Ⓓ (TB06)
Cylinder thermo sensor	2+GND(shield wire)	100 mA	5 m	0.75 mm² or more	Ⓐ, Ⓑ (TB06)
Second remote controller	2 line	50 mA	50 m	0.75 mm² or more	①, ② (TB07)

▼ Control parts specifications

	Power	Maximum current	Type
Motorized 3-way valve (for hot water)	AC 230 V	100 mA	Spring return type Note: 3-wire SPST and SPDT type can be used by changing the function code.
Motorized 2-way valve (for cooling)	AC 230 V	100 mA	spring return type (normally open)
Motorized mixing valve type 1 (for 2-zone)	AC 230 V	100 mA	60 sec 90º. SPDT type Note: SPST and 20 to 240 sec type can be used by changing the function code.

▼ Output line specifications

Description	Output	Maximum current	Max voltage	Maximum length	
External pump No.1	AC230V	1 A	–	12 m	Interlocked with the Hydro Unit pump
External boost heater	AC230V	1 A	–	12 m	Output as required when outdoor air temperature is -10°C or less
Boiler control	Non-voltage contacts	0.5 A	AC230 V	12 m	Output as required when outdoor air temperature is -10°C or less
		1 A	DC24 V	12 m	
ALARM Output	Non-voltage contacts	0.5 A	AC230 V	12 m	
		1 A	DC24 V	12 m	
Operation Output	Non-voltage contacts	0.5 A	AC230 V	12 m	
		1 A	DC24 V	12 m	

EN

Description	Output	Maximum current	Max voltage	Maximum length	
Defrost Output	Non-voltage contacts	0.5 A	AC230 V	12 m	
		1 A	DC24 V	12 m	

▼ Input line specifications

Description	Input	Maximum length
Emergency stop control	Non-voltage	12 m
Cylinder thermostat input	Non-voltage	12 m
Cooling thermostat input	Non-voltage	12 m
Heating thermostat input	Non-voltage	12 m

⚠ CAUTION

Earthing arrangements
The Hydro Unit and related equipment must be earthed in accordance with your local and national electrical regulations. It is essential that the equipment is earthed to prevent the electric shock and damage to the equipment.

Electrical connection to hydro unit

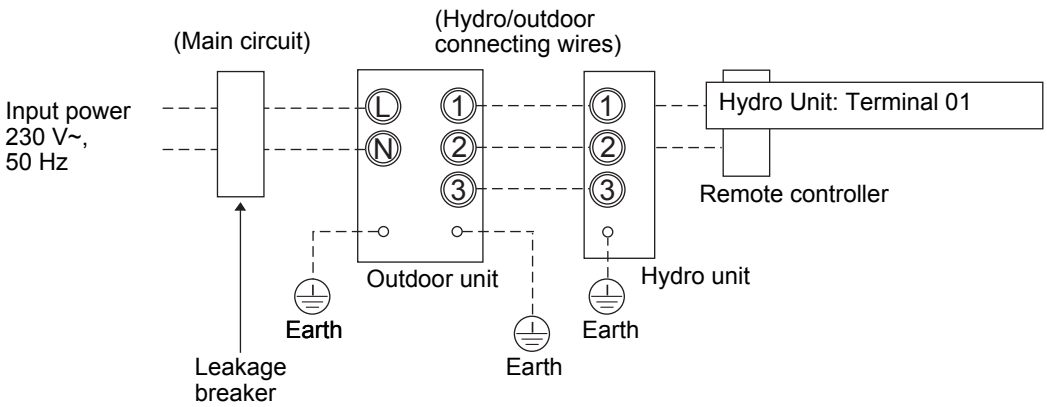
- Remove the front cover and the electrical box cover from the Hydro Unit.
- The Hydro Unit power cable must be sized in accordance with refer to “Electrical supply/cable specifications”.
- Connect the Hydro Unit power cable to Terminal 02 as shown below.

  Single Phase Units: Live conductor – Terminal L1
  Neutral conductor – Terminal L2
  Earth conductor – Earth terminal

  Three Phase Units: Phase 1 conductor – Terminal L1
  Phase 2 conductor – Terminal L2
  Phase 3 conductor – Terminal L3
  Neutral conductor – Terminal N
  Earth conductor – Earth Terminal
- Ensure the Hydro Unit power cable is secured using the cable clamp fitted in the electrical box.
- Ensure the Hydro Unit power cable connection terminals are tight.

Outdoor unit to hydro unit electrical connection

▼ Fig. 7-22



- Ensure electrical circuits are isolated before commencing work.
- The Outdoor Unit to Hydro Unit interconnecting cable must be sized in accordance with refer to “Electrical supply/cable specifications”.
- Connect the Outdoor Unit to Hydro Unit interconnecting cable as shown in the diagram above.

- Ensure the Outdoor Unit to Hydro Unit interconnecting cable is secured using the cable clamp fitted in the electrical box.
- Ensure the Outdoor Unit to Hydro Unit interconnecting cable connection terminals are tight.

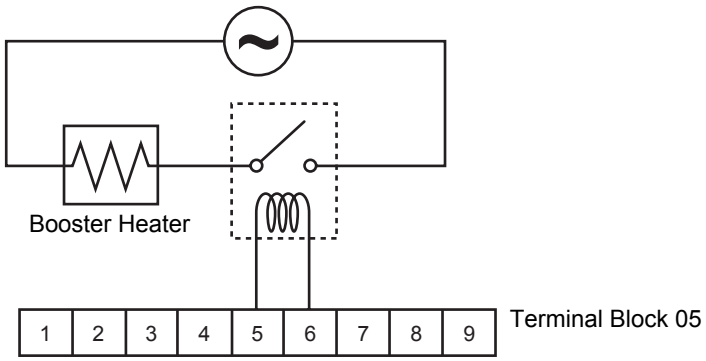
Electrical connection for external booster heater

⚠ CAUTION

- **The maximum current available from the booster heater output is 1 A. Do not connect the booster pump directly to Terminal Block 05 on the Hydro Unit. A separate contactor, supplied locally, must be used to supply the booster heater.**
- The booster heater can be installed only for room heating and cannot be used for hot water supply.
- Install the booster heater downstream of the 3-way valve on the indoor unit side.
  The booster heater is an external heater, supplied locally, used to assist the Hydro Unit during low ambient conditions.
- The AC230 V 1 A output from the Hydro Unit must only be used to energize an external contactor. (Supplied locally)
- The output from the Hydro Unit is only enabled when the outdoor air temperature is less than -10°C.
- Ensure the external booster heater is installed and set up in accordance with all Local, National and International regulations.

- Connect the external booster heater to the Hydro Unit in accordance with the diagram shown below.
- Connect the coil, of the field supplied contactor, to terminals 5 & 6 on Terminal Block 05. The contactor will energize in the event of low ambient conditions.
- A separate dedicated electrical supply must be used for the external booster heater. This must be connected through the contacts on the field supplied contactor.

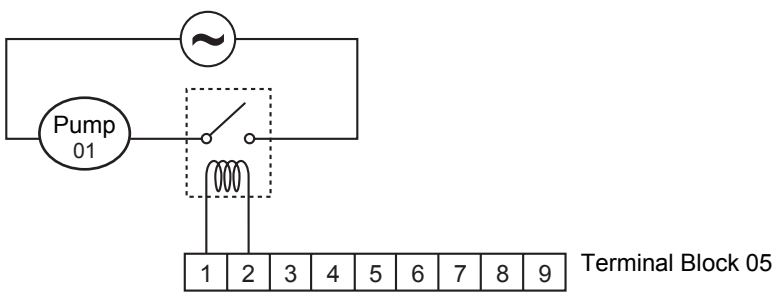
▼ Fig. 7-23



Electrical connection for external additional pumps

- The Hydro Unit has the facility to connect an additional circulating pump, if required, into the heating or cooling system.
- There is an output available from the Hydro Unit. AC230 V 1 A (maximum) is available from each output. The output for each additional pump is synchronized with the operation of the main circulating pump inside the Hydro Unit.
- Connect the additional pumps as shown in the diagram below.
- Connect external pump 1 to terminals 1 & 2 on Terminal Block 05.
- Install external pumps so that their motive power does not affect the internal pump.

▼ Fig. 7-24



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3-way valve (diverter) connection

Required Valve Specification:

Electrical Specification: 230 V; 50 Hz; <100 mA
Valve Diameters: Port A, Port B: Ø 1 1/4"
Return Mechanism: 3 types of 3-way valve (diverter) can be used.
Set the 3-way valve in use with the DIP switch SW13-1 on the Hydro Unit board.

		SW13-1
Type 1	2-wire spring return	OFF
Type 2	3-wire SPST	OFF
Type 3	3-wire SPDT	ON

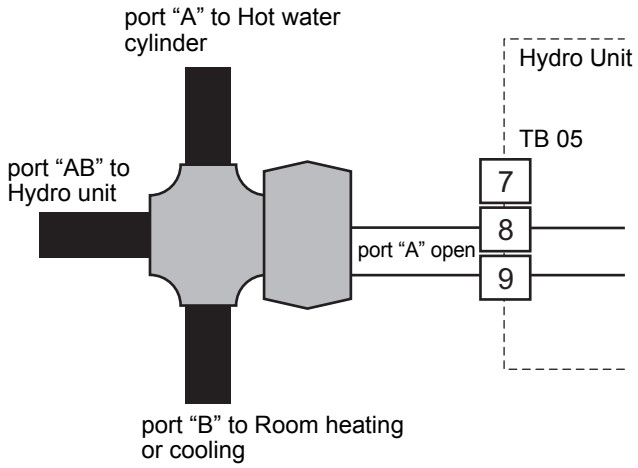
NOTE

Continuous operation of the valve motor at the fully open position is not recommended.

- The 3-way diverter valve is used to select either domestic hot water or space heating.
- Connect the 3-way diverter valve to terminals 7, 8 and 9 on Terminal Block 05.
- Connect the 3-way diverter valve in accordance with the diagram below:-

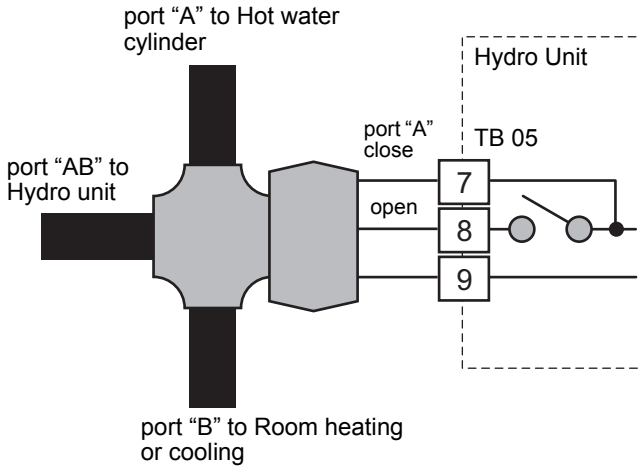
▼ Fig. 7-25

Type 1: SPRING RETURN



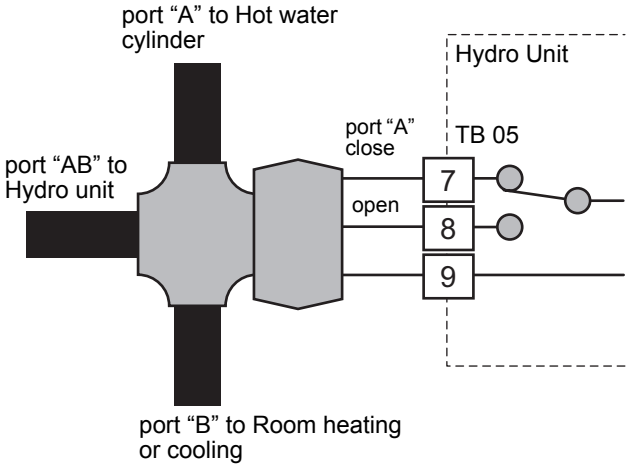
▼ Fig. 7-26

Type 2: SPST



▼ Fig. 7-27

Type 3: SPDT



3-way mixing valve connection

Required Actuator Specification

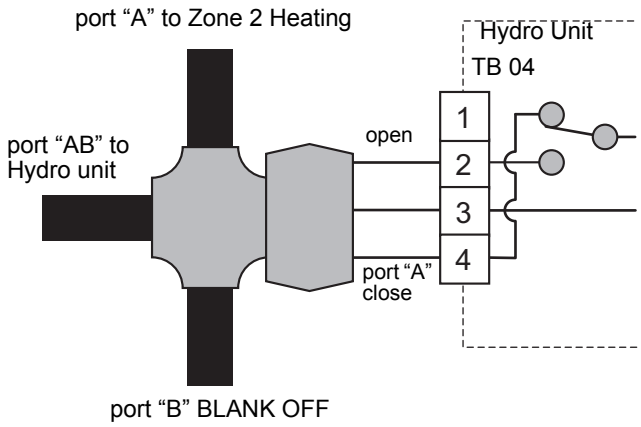
Electrical Specification:230 V; 50 Hz; <100 mA

The 3-way mixing valve is used to achieve the temperature differential needed in a 2-zone heating system.

- Connect the 3-way mixing valve to terminals 2, 3 and 4 on Terminal Block 04 (for Type 1 mixing valve) or on terminals 1, 2 and 3 on Terminal Block 04 (for Type 2 mixing valve).
- Connect the 3-way mixing valve in accordance with the diagrams below:-

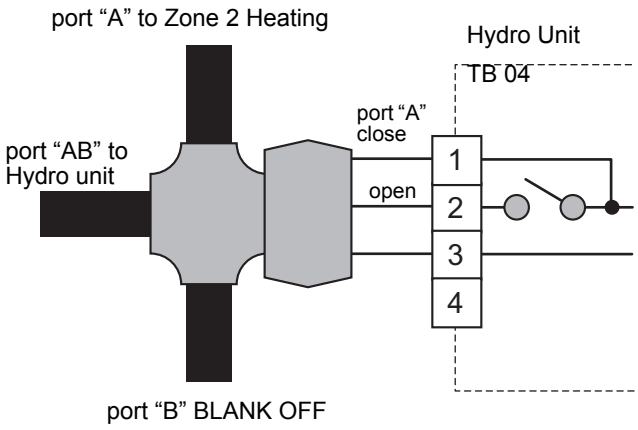
▼ Fig. 7-28

Type 1: SPDT



▼ Fig. 7-29

Type 2: SPST



Hot water cylinder connection (optional)

- **Please refer to “Electrical supply/cable specifications” for fuse/cable size and for connection details.**

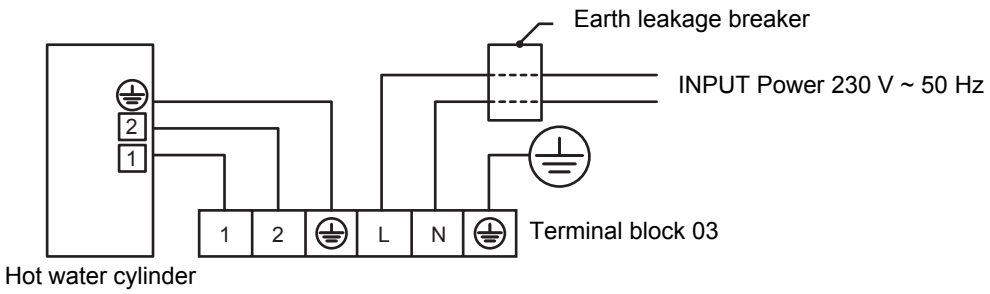
Electrical Connection (Hot Water Cylinder Electric Heater)

- The electric heater, incorporated in the hot water cylinder, requires a separate supply to Hydro Unit.
- Connect the hot water cylinder heater electrical supply in accordance with shown below:
  Live conductor: Terminal L on Terminal Block 03
  Neutral conductor: Terminal N on Terminal Block 03
  Earth Conductor: Earth terminal on Terminal Block 03
- Connect the hot water cylinder heater to the Hydro Unit as shown below:
  Live conductor to hot water cylinder: Terminal 1 on Terminal Block 03
  Neutral conductor to hot water cylinder: Terminal 2 on Terminal Block 03
  Earth conductor to hot water cylinder: Earth terminal on Terminal Block 03

Electrical Connection (Hot Water Cylinder temperature Sensor)

- Connect the hot water cylinder temperature sensor as shown below to terminals A & B on Terminal Block 06 in the Hydro Unit.
- Please ensure that the interconnecting cable, between the Hydro Unit and the hot water cylinder, is connected to earth at both ends of the cable using the shield wire.

▼ Fig. 7-30



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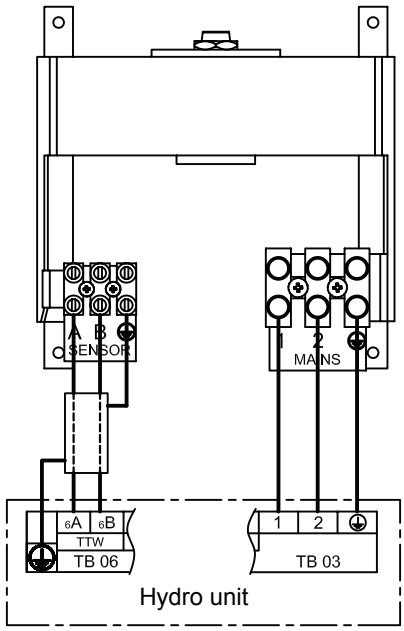
Hot water cylinder electrical box connections

▼ **Fig. 7-31**



Additional hydro unit outputs

Alarm and Boiler Outputs

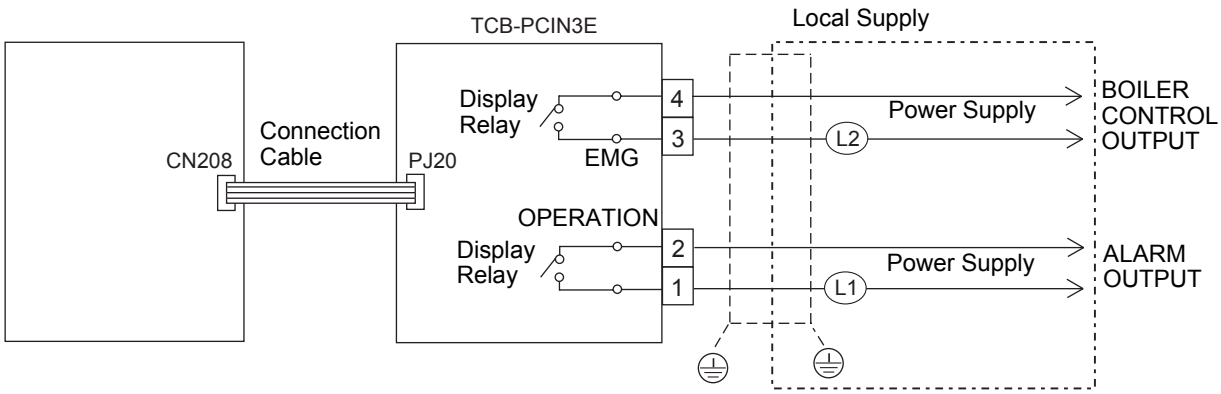
Alarm Output: L1: Alarm output

- Output enabled when the system is in alarm/fault condition.
- Volt free contact - specification shown below:
  AC230 V; 0.5 A (maximum)
  DC24 V; 1 A (maximum)
- Connection details: Terminals 1 and 2 (OPERATION) on MCC-1217 (Refer to “Fig. 7-32”)

Boiler Control Output: L2: Boiler drive permission output

- Output enabled when outdoor ambient temperature <-10°C
- Volt free contact - specification shown below:
  AC230 V; 0.5 A (maximum)
  DC24 V; 1 A (maximum)
- Connection details: Terminals 3 and 4 (EMG) on MCC-1217 TB (Refer to “Fig. 7-32”)

▼ **Fig. 7-32**



⚠ CAUTION

- Be sure to prepare a non-voltage contact for each terminal.
- Display Relay capacity of “EMG” and “OPERATION”.
  Below AC230 V 0.5 A (COS Ø = 100 %)
  When connecting loads such as relay coil to “L1, L2” load, insert noise surge absorber.
  Below DC24 V 1 A (Non-inductive load)
  When connecting load such as relay coil to “L1, L2” load, insert the bypass circuit.

Optional inputs to hydro unit

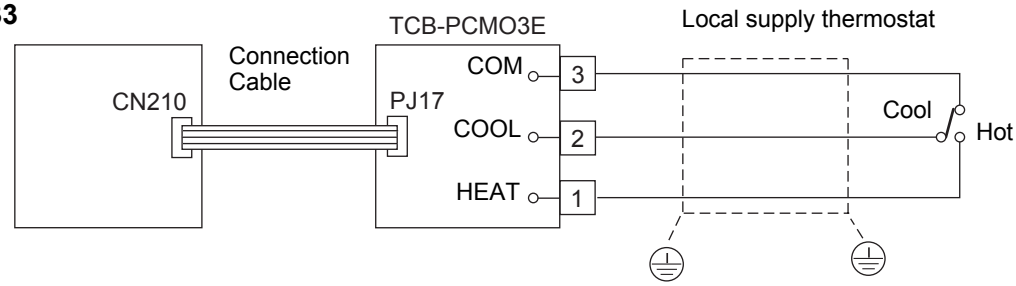
Room Thermostat Input:

1–2: Room thermostat input for cooling mode

1–3: Room thermostat input for heating mode

- Output enabled when either heating or cooling mode selected on room thermostat. (locally supplied)
- Volt free contacts
- Connection details:
  Cooling Connection: Terminals 3 (COM) and 2 (COOL) on TCB-PCMO3E (Refer to “Fig. 7-33”)
  Heating Connection: Terminals 3 (COM) and 1 (HEAT) on TCB-PCMO3E (Refer to “Fig. 7-33”)

▼ Fig. 7-33



⚠ CAUTION

- Be sure to prepare a non-voltage continuous contact for each terminal.
- Supplementary Insulation must be added to user touchable part of switches.

Cylinder Thermostat Input

S1: Cylinder thermostat input

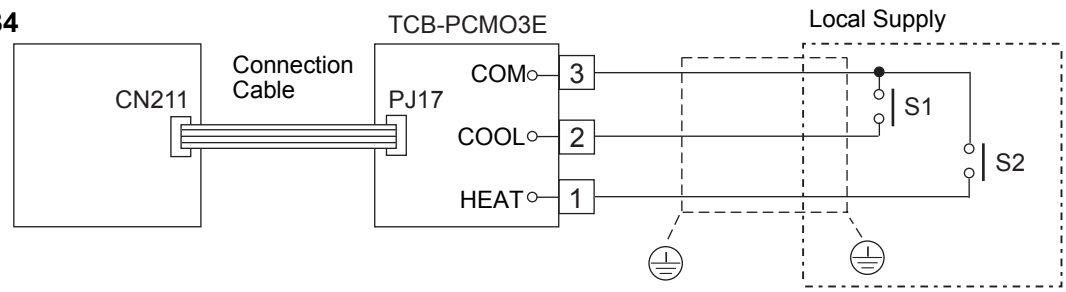
- Non-voltage contacts
- Connection details:
  Cylinder Thermostat: Terminals 3 (COM) and 2 (COOL) on TCB-PCMO3E (Refer to “Fig. 7-34”)

Emergency Shutdown input

S2: Emergency stop input

- Non-voltage contacts
- Connection details:
  Emergency stop: Terminals 3 (COM) and 1 (HEAT) on TCB-PCMO3E (Refer to “Fig. 7-34”)

▼ Fig. 7-34



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⚠ CAUTION

- Be sure to prepare a non-voltage continuous contact for each terminal.
- Supplementary Insulation must be added to user touchable part of switches.

Electrical safety checks

The electrical safety checks must be completed before turning on the electrical supplies to the Air to Water heat pump system. The electrical safety checks should be completed by a qualified electrician. All results measured should comply with your local/national electrical installation regulations.

Earth continuity test

On completion of the electrical installation a resistance test should be completed on the earth conductor to ensure continuity between all pieces of equipment on the earth conductor.

Insulation resistance test

This test must be completed using a 500 V D.C. insulation resistance tester. Insulation resistance tests should be completed between each live terminal and earth.

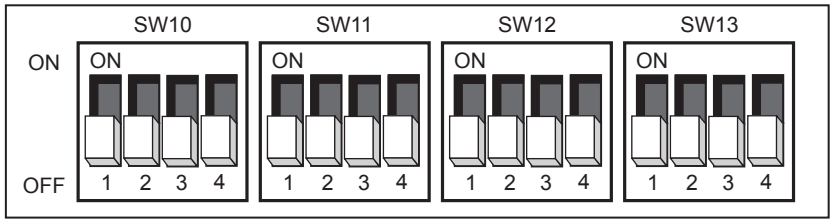
8 START UP AND CONFIGURATION

Set the DIP switches and function codes.

■ Setting DIP Switches on the Board in the Hydro Unit

- Detach the front cover and the electric parts box cover of the Hydro Unit.
- Set the DIP switches on the main board.

▼ Fig. 8-01



SW10	Description	Switch mode			
		Default setting			
1	Internal pump P1 operating mode	Continuous operation	OFF	ON	HP synchronized
3	External P2 pump operation	Continuous operation	OFF	ON	Interlocked with the internal pump synchronized with P1.

SW11	Description	Switch mode			
		Default setting			
1	Internal backup heater operation	Operate	OFF	ON	Not operate
2	Hot water cylinder heater operation	Operate	OFF	ON	Not operate
3	Booster heater operation	Operate	OFF	ON	Not operate

SW12	Description	Switch mode			
		Default setting			
1	Hot water supply operation	Valid	OFF	ON	Invalid
2	Zone 1 operation	Valid	OFF	ON	Invalid
3	Zone 2 operation	Invalid	OFF	ON	Valid

SW13	Description	Switch mode			
		Default setting			
1	Type of motorized 3-way valve	• 2-wire spring return type • 3-wire SPST type	OFF	ON	3-wire SPDT type
2	Interlocking with boiler	Invalid	OFF	ON	Valid
3	Auto restart for power failure	Auto restart	OFF	ON	Manual restart
4	–				

SW02	Description	Default setting			
4	Room thermostat	Invalid	OFF	ON	Valid

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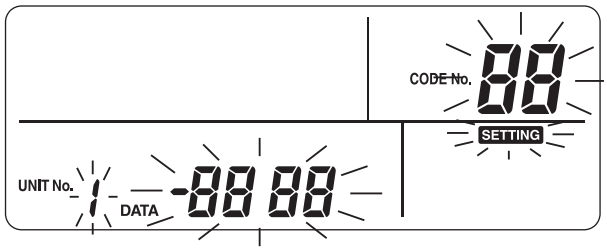
■ Setting Function Codes for Hydro Unit and Remote Controller

Set function codes for various operation modes with the remote controller.
There are two types of setting.
1) Hydro Unit function code setting
2) Remote controller function code setting

Setting remote controller mode

<Setting Hydro Unit Function Code>



1 **Press the TEST + SET + SELECT buttons for four seconds or more to enter the remote controller function code setting mode.**

2 **Set the function code (CODE No.) with the TEMP. buttons. (CODE No.: 01 to 91)**

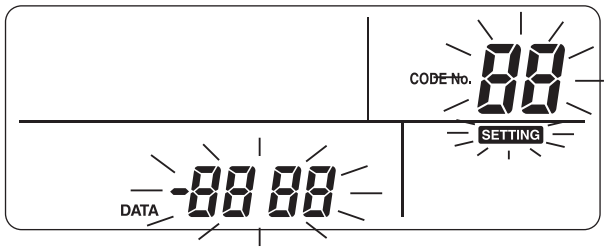
3 **Set data (DATA) with the TIME buttons.**

4 **Press the SET button to determine the settings.**

5 **The CL button is enabled only before the SET button is pressed and the function code is changed.**

6 **Press the TEST button to end the settings.**

<Setting Remote Controller Function Code>



1 **Press the TEST + CL + TEMP. buttons for four seconds or more to enter the remote controller function code setting mode.**

2 **Set the function code (CODE No.) with the TEMP. buttons. (CODE No.: 01 to 13)**

3 **Set data (DATA) with the TIME buttons.**

4 **Press the SET button to determine the settings.**

5 **The CL button is enabled only before the SET button is pressed and the function code is changed.**

6 **Press the TEST button to end the settings.**

Main setting items

(1) Setting Hot Water Temperature Range (function code 18 to 1F)

- Set the temperature range for heating (zone 1, zone 2), cooling, and hot water.
- The upper-limit and lower-limit temperatures of each mode can be set.

(2) Setting Heat Pump Operation Conditions for Hot Water Supply (function code 20 and 21)

- Set the heat pump start water temperature and heat pump stop water temperature.
- The heat pump starts working when the water temperature lowers below the set start water temperature. It is recommended that the default value be used.

(3) Compensating Hot Water Temperature (function code 24 and 25)

- Compensate the target temperature from the remote controller set temperature when the hot water temperature lowers below the set outside air temperature.

(4) Setting Hot Water Boost (function code 08 and 09)

- Set the control time and target temperature when the HOT WATER BOOST button on the remote controller is pressed.

(5) Setting Anti-Bacteria

- Set the control for the hot water cylinder when ANTI BACTERIA is set with the remote controller.
- Set the target temperature, control period, start time (24-hour notation), and target temperature retention period.
- Make this control setting according to regulations and rules of respective countries.

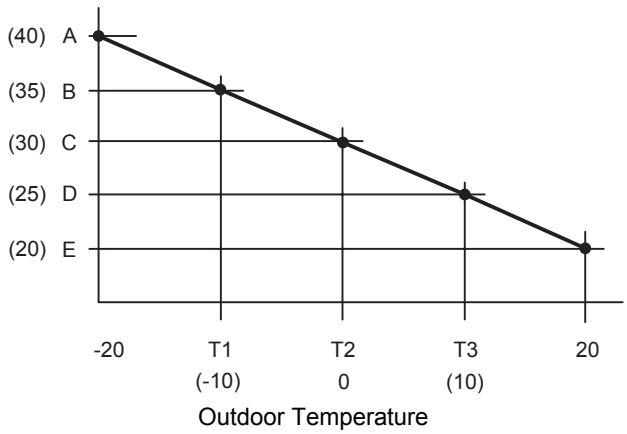
(6) Setting Priority Mode Temperature

- Set the outside air temperature that changes the preferred operation mode.
- Hot Water - Heating Switching Temperature
  Heating operation takes precedence when the temperature lowers the set temperature.
- Boiler HP Switching Temperature
  When the temperature lowers the set temperature, the HP operation stops and the external boiler output is made.

(7) Setting Heating Auto Mode Temperature (function code 27 to 31)

- Compensate the target temperature when Auto is set for temperature setting on the remote controller.
- The outside air temperature can be set to one of three points (T1 and T3) within a range of -15 to 15°C.
- The target temperature can be set to a value from 20 to 55°C.
- However, A > B > C > D > E.

▼ Fig. 8-02



- The entire curve can be adjusted plus and minus 5°C by function code 27.

(8) Setting Frost Protection Temperature (function code 3A to 3B)

- Set the function when the FROST PROTECTION button on the remote controller is pressed.
- Set enabling/disabling of this function and the target water temperature.
- If disabling is set, the frost protection operation is not performed even when the FROST PROTECTION button is pressed.

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(9) Setting Frequency of Output to Internal Heater (function code 33 to 34)

- The increase/decrease time is used to set the response time.

(10)Setting Night Setback (function code 26. remote controller function code 0F to 11)

- Set the function when the NIGHT button on the remote controller is pressed.
- Set enabling/disabling of this function, reduction temperature, start time, and end time.
- If disabling is set, the night setback operation is not performed even when the NIGHT button is pressed.

(11)Setting 2-Way Valve (for Cooling) Operation (function code 3C)

- When using both cooling and heating operations and there is an indoor unit only for heating (such as floor heating), install the 2-way valve and set this function code.

(12)Setting 3-Way Valve Operation (function code 54)

- This setting is not necessary for normal installation. Make this setting to invert the logic circuit in case ports A and B of the 3-way valve are wrongly attached and it cannot be rectified on site.

(13)Mixing valve types and setting

- Set the time period from full close to full open of the 2-zone control mixing valve. Set a value that is 1/10 of the actual time.

(14)Setting Heating/Hot Water Switching when Boiler Is Used (function code 3E)

- When boiler is used, make this setting to operate the Hydro Unit by the instruction from the boiler.

(15)Setting Heat Pump Operating Time for Hot Water Supply Operation

- Set the time period from the start of heat pump run to the start of heater energization at the beginning of hot water supply operation. If a long period is set, it takes long time for heating water.

(16)Setting Cooling ON/OFF

- Set this function when performing cooling operation.

(17)Remote controller time indication

- 24-hour or 12-hour notation is selected for the timer.

(18)Setting Nighttime Quiet Operation

- Issue an instruction for low-noise mode operation to the outdoor unit. Enabling/disabling of this function, start time, and end time can be set.

(19)Setting Alarm Tone

- The remote controller alarm tone can be set.

Function code settings

Function code setting			Function code setting address		Default	Range	Unit	Unit	Note
			Hydro unit	Remote controller					
1. Setting temperature range	01. Upper-limit temperature for heating Zone 1		1A		55	37 to 55	°C	1	
	02. Lower-limit temperature for heating Zone 1		1B		20	20 to 37	°C	1	
	03. Upper-limit temperature for heating Zone 2		1C		55	37 to 55	°C	1	
	04. Lower-limit temperature for heating Zone 2		1D		20	20 to 37	°C	1	
	05. Upper-limit temperature for cooling		18		25	18 to 30	°C	1	
	06. Lower-limit temperature for cooling		19		10	10 to 18	°C	1	
	07. Upper-limit temperature for hot water		1E		75	60 to 80	°C	1	
	08. Lower-limit temperature for hot water		1F		40	40 to 60	°C	1	
2. Hot water operation	01. Heat pump start temperature		20		38	20 to 45	°C	1	
	02. Heat pump stop temperature		21		45	40 to 50	°C	1	
3. Hot water temperature compensation	01. Temperature compensation start outside air temperature		24		0	-20 to 10	°C	1	
	02. Compensation temperature		25		3	0 to 15	Degree	1	
4. Hot Water Boost	01. Operation time x 10 min		08		6	3 to 18	Minute	1 (x10)	
	02. Setting temperature		09		75	40 to 80	°C	1	
5. Anti -bacteria	01. Setting temperature		0A		75	70 to 80	°C	1	
	02. Operation cycle			0D	7	1 to 10	Day	1	
	03. Start time			0C	22	0 to 23	Hour	1	
	04. Operation time		0B		30	0 to 60	Minute	1	
6. Priority mode	01. Hot water and heating switching temperature		22		0	-20 to 20	°C	1	
	02. Boiler and heat pump switching temperature		23		-10	-20 to 20	°C	1	
7. Heating Auto setting	01. Outside temperature T1		29		-10	-15 to 0	°C	1	
	02. Outside temperature T3		2B		10	0 to 15	°C	1	
	03. Setting temperature A at -20°C	When A ≥ B ≥ C ≥ D ≥ E	2C		40	20 to 55	°C	1	
	04. Setting temperature B at T1°C		2D		35	20 to 55	°C	1	
	05. Setting temperature C at T2°C		2E		30	20 to 55	°C	1	
	06. Setting temperature D at T3°C		2F		25	20 to 55	°C	1	
	07. Setting temperature E at +20°C		30		20	20 to 55	°C	1	
	08. Ratio of Zone 2 in Zone 1 Auto mode		31		80	0 to 100	%	10	
	09. Temperature shift of entire AUTO curve		27		0	-5 to 5	Degree	1	

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Function code setting		Function code setting address		Default	Range	Unit	Unit	Note
		Hydro unit	Remote controller					
8. Frost Protection	01. Function 0: Invalid, 1: Valid	3A		1	0, 1		Select	
	02. Setting temperature	3B		15	8 to 20	°C	1	
9. Heater control	01. Down time (Example) Heater 0: 5 min, 1: 10 min, 2: 15 min, 3: 20 min	33		1 (10 min)	0 to 3		Select	
	02. Up time (Example) Heater 0: 10 min, 1: 20 min, 3: 30 min, 4: 40 min	34		0 (10 min)	0 to 3		Select	
10. Night setback	01. Change temperature range	26		5	3 to 20	Degree	1	
	02. Start time		0E	22	0 to 23	Hour	1	
	03. End time		0F	06	0 to 23	Hour	1	
11. Room temperature setting	01. Room temperature control adjustment 0: Valid, 1: Invalid.		02	0	0, 1		Select	
	02. Compensation for temperature	35		1	1 to 5	Degree	1	
	03. Down time zone B (x 5 min)	36		6 (30 min)	1 to 24 (5 to 120 min)	Minute	1 (x5)	
	04. Up time zone C (x 5 min)	37		6 (30 min)	1 to 24 (5 to 120 min)	Minute	1 (x5)	
12. Hydro 2-way valve operation control	Activating 2-way valve for cooling 01. (0: Activated during cooling, 1: Not activated during cooling)	3C		0	0, 1		Select	
13. 2-zone mixing valve drive time	Previous drive time x 10 seconds	0C		6 (60 sec)	3 to 24 (30 to 240 sec)		1 (x10)	
14. Boiler operates synchronized with heat pump	01. (0: Synchronized, 1: Not synchronized)	3E		0	0, 1		Select	
15. Maximum operation time of hot water heat pump	01. Maximum heat pump operation time in hot water operation priority mode	07		30	1 to 120	Minute	1	
16. Cooling operation	01. (0: Cooling and heating, 1: Heating only)	02		1	0, 1		Select	
17. Remote controller indication	01. 24-hour or 12-hour notation of timer 0: 24-hour, 1: 12-hour		05	0	0, 1		Select	
18. Nighttime low-noise operation	01. (1: Valid, 0: Invalid)		09	0	0, 1			
	02. Start time		0A	22	0 to 23	Hour	1	
	03. End time		0B	06	0 to 23	Hour	1	
19. Alarm tone	01. Tone switching 0: OFF, 1: ON		11	1	0, 1		Select	

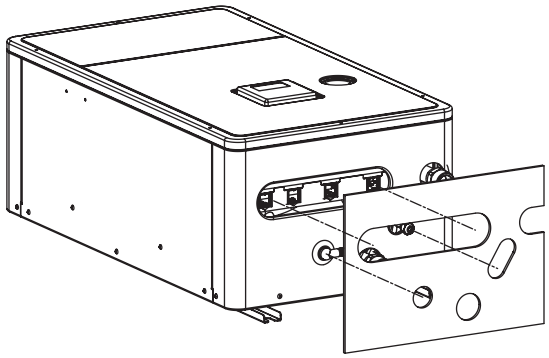
■ Settings by Purpose

Settings when hot water supply function is not used

- When the hot water supply function is not used, set DIP SW12-1 on the Hydro Unit board to ON. (Refer to page 31.)

Setting for cooling

- For Hydro Units that do not perform cooling (those for floor heating, etc.), procure a motorized 2-way valve (for cooling) (refer to “Control parts specifications” on page 23 for the details.) locally and attach it to the water pipe that is not used for cooling. Connect the valve cables to terminals TB05 (3) and (4) of the Hydro Unit.
- Press long the TEST + SET + SELECT switches on the remote controller to change the Hydro Unit function code, and change address 02 to 0, and then press the SET button to enable the function. Press the TEST button to exit the setting mode.
- Stick the optional insulator for cooling to the bottom of the Hydro Unit.



Settings for hot water supply

- Prepare the optional hot water cylinder.
- Procure a motorized 3-way valve (refer to “Control parts specifications” on page 23 for the details.) locally and perform piping. Connect the valve cables to terminals TB05 (7), (8) and (9) of the Hydro Unit.
- Set DIP SW12-1 on the Hydro Unit board to OFF. (Refer to page 31.)
- Connect the power supply unit for the hot water cylinder heater to terminals TB03 L and N of the Hydro Unit.
- Connect cables between the Hydro Unit and the hot water cylinder as follows:
  Hydro Unit terminals TB03 (1), (2), and earth — Hot water cylinder (1), (2), and earth
  TB06 A, B, and earth — Hot water cylinder A, B, and earth

Settings for 2-zone temperature control

- Procure a motorized mixing valve (refer to “Control parts specifications” on page 23 for the details.) locally and perform piping. Connect the valve cables to terminals TB04 (1), (2), (3) and (4) of the Hydro Unit.
- Procure a buffer tank locally.
- Procure a water pump locally, and connect its cables to terminals TB05 (1) and (2) of the Hydro Unit.
  To inhibit interlocking the water pump with the internal pump of the Hydro Unit, set DIP SW10-3 on the Hydro Unit board to OFF.
- Set DIP SW12-3 on the Hydro Unit board to ON. (Refer to page 31.)
  Attach the temperature sensor (TFI) connected to terminals TB06 C and D of the Hydro Unit near the hot water inlet of the Hydro Unit.
- Fix TFI sensor on the room heating supply pipe by using the connector procured in locally.
- Cover the cables with insulation tube (minimum 1 mm) or conduit so that the user cannot touch them directly.
- Cover the TFI sensor's cables and sensor with insulation tube (minimum 1 mm) shown in the diagram on the right.

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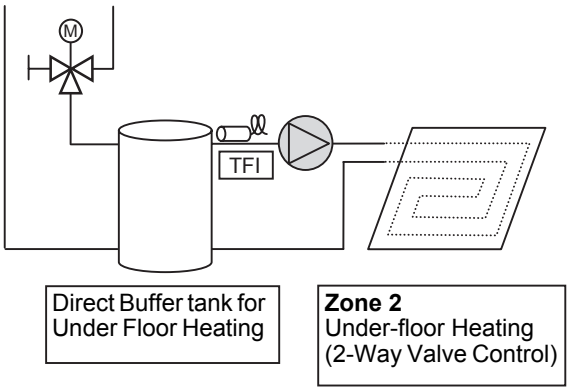
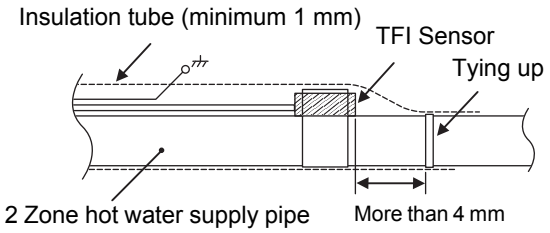
▼ Fig. 8-03



▼ Fig. 8-04



9 TEST RUN

Use operation buttons usually to conduct a test run.
If the outside air temperature or water temperature is outside the setting value range, press the TEST button on the remote controller and then start a test run. Since the protection setting is disabled in the TEST mode, do not continue a test run longer than 10 minutes.

- Press the TEST button on the remote controller. An indication “TEST” appears on the remote controller.
- Press the ZONE1, 2 button and select “heating” with the OPERATE MODE button.
  The pump is activated in 30 seconds.
  If air is not released completely, the flow rate switch is activated to stop operation. Release air again according to the piping procedure.
  Little air bite is discharged from the purge valve.
- Check that the air bite sound disappears.
- Check that the hydraulic pressure has become the predetermined pressure 0.1 to 0.2 MPa (1 to 2 bar). If the hydraulic pressure is insufficient, replenish water.
- Heating operation starts. Check that the hydro unit starts heating.
- Press the OPERATE MODE button and select “cooling.”
- Cooling operation starts. Check that the hydro unit starts cooling and that the floor heating system is not cooled.
- Press the ZONE1, 2 button to stop operation.
- Press the HOT WATER button to start hot water supply operation.
- Check that there is no air bite.
- Check that hot water is present at the connection port of the hot water cylinder.
- Press the HOT WATER button to stop the hot water supply operation.
- Press the TEST button to exit the test mode.

10 MAINTENANCE

Execute periodic maintenance at least once a year.

Check points

- Check all electrical connections and make adjustments if they are necessary.
- Check the water pipes of the heating systems in particular any evidence of leakage.
- Check the expansion tank inner pressure. If it is insufficient, enclose nitrogen or dry air in the tank.
- Check that the hydraulic pressure is 0.1 MPa (1 bar) or more with a water manometer. If it is insufficient, replenish tap water.
- Pull the lever of the pressure relief valve and check operation.
- Clean the strainer.
- Check the pump for an abnormal sound or other abnormalities.

11 SENSOR TEMPERATURE MONITORING FUNCTION

■ Sensor Temperature Monitoring Function

The sensor sensing temperature is displayed on the remote controller.
This function allows you to make sure whether the sensor is installed properly.
Press the TEST (🔧) + CL ( ) buttons for four seconds or more.
Select the function code with the TEMP. (▼) (▲) buttons.
Press the TEST (🔧) button to exit the test mode.

Function code	Location	Indication
06	Hydro unit	Return water temperature °C
08		Hot water temperature °C
09		2-zone sensor temperature °C
0A		Hot water cylinder temperature sensor °C
0B		Motorized mixing valve position
60	Outdoor unit	Heat exchanger temperature °C
61		Outside air temperature °C
62		Refrigerant discharge temperature °C
63		Refrigerant intake temperature °C
6A		Current value (in the inverter) A
70		Compressor operating frequency
F4	Operating hours	Hydro unit AC pump total operating hours x100 hours
F5		Hot water cylinder heater total operating hours x100 hours
F6		Hydro unit heater total operating hours x100 hours

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12 TROUBLESHOOTING

■ Fault Symptoms

Symptom	Possible cause	Corrective action
Room is not heated or cooled. Water is not hot enough.	Incorrect remote controller setting	Check remote controller operation and temperature setting
	Incorrect function code setting	Check function code setting with the function code table.
	Backup heater disconnected	Check backup heater and bimetal thermostat.
	Insufficient capacity	Check selection of equipment.
	Sensor defect	Check whether temperature sensor is installed at the normal position.
Nothing is displayed on the remote controller.	Power is not supplied.	Check power supply wiring.
	Incorrect setting	Check DIP switch setting on the Hydro Unit board. Check the setting with the function code table.
Flow rate switch is activated. Error code [P01]	Air bite in the pump	Release air completely according to the procedure.
	Low hydraulic pressure	Set hydraulic pressure considering pipe height, and replenish water until manometer shows a value of set hydraulic pressure or more.
	Strainer is clogged.	Clean the strainer.
	Large resistance on the hydro side	Widen water path to the hydro unit or adopt a bypass valve.
	Malfunction of motorized 3-way valve for hot water supply	Check wiring and parts.
Hot water leaks from pressure relief valve.	Excessive hydraulic pressure	Set hydraulic pressure considering pipe height, and replenish water until manometer shows a value of set hydraulic pressure or more.
	Insufficient capacity of expansion tank	Check expansion tank capacity compared to total water amount. If it is insufficient, install another expansion tank.
	Expansion tank failure	Check the air pressure.

Alarm indication	Alarm description and generation/reset conditions
E03	Regular communication error between hydro unit and remote controller (system controller) If there is no regular communication from the remote controller for three minutes, the hydro unit regards it as no remote controller. If there is no communication from both sides, alarm E03 occurs. Auto-reset: When successful regular communication is made
E04	Regular communication error between hydro unit and outdoor unit When serial signal from the outdoor unit cannot be received though normal serial signal is sent to the outdoor unit 1) When serial signal cannot be received continuously for 60 seconds (S code communication) 2) Communication is still not successful for 80 seconds through three retries if serial signal cannot be received for 20 seconds after new communication (f code) starts When the remote controller starts operation, serial transmission starts with the new communication format. Auto-reset: When successful regular communication is made
F03	Condensing temperature TC sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F10	Hydraulic heat exchanger inlet temperature TWI sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F11	Hydraulic heat exchanger outlet temperature TWO sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed

Alarm indication	Alarm description and generation/reset conditions
F14	Hot water cylinder temperature TTW sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F17	Floor inlet temperature TFI sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F18	Internal heater outlet temperature TWO sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F20	Floor inlet temperature TFI sensor disconnection or wrong installation (This alarm is reset by stopping operation and is checked again.)
F23	Low-pressure sensor defect If open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F29	Hydraulic heat exchanger EEPROM defect One mismatch is detected if there is no verification ACK after data write to the EEPROM Reset condition: This alarm is inhibited while the unit is not working. (When EEPROM1K is mounted, this alarm cannot be reset.)
F30	Onboard expansion IC defect This alarm is not reset automatically.
L07	Group line in an hydro unit This alarm is checked during initial communication immediately after power-on. This alarm occurs immediately after operation start. This alarm is not reset automatically. (This alarm is inhibited while the unit is not working, but occurs again after the unit operates.)
L09	Hydro unit capacity has not been set. This alarm is checked immediately after power-on. This alarm is not reset automatically. (This alarm is inhibited while the unit is not working, but occurs again after the unit operates.)
A01	Pump defect or abnormal flow rate This alarm is not reset automatically.
A02	Excessive water temperature increase by the heating heater Auto-reset:
A03	Excessive water temperature increase in the hot water cylinder
A04	Freezing is detected. Auto-reset:
A07	High-pressure switch malfunction This alarm is not reset automatically.
A08	Low-pressure sensor malfunction This alarm is not reset automatically.
A09	Overheat preventive operation malfunction Auto-reset: When operation mode is changed
A11	Release preventive operation malfunction This alarm occurs when the Hydro Unit enters the forced-stop zone 10 times.
P31	Self-hydro unit is stopped due to alarm of other hydro unit. When alarm occurs in an hydro unit in the group, other hydro units must also be stopped with refrigerant control. When alarm E03, L03 or L07 occurs in the header unit in the group, other hydro units must also be stopped because they do not know which header unit (remote controller) to follow. Auto-reset: When the first alarm is reset

Alarm indication	Main failure part	Description
F04	Outdoor unit discharge temperature sensor TD defect	When open- or short-circuit of discharge temperature sensor TD is detected
F06	Outdoor unit temperature sensor TE or TS defect	When open- or short-circuit of heat exchanger temperature sensor TE or TS is detected

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Alarm indication	Main failure part	Description
F08	Outdoor unit outside air temperature sensor TO defect	When open- or short-circuit of outside air temperature sensor TO is detected
H01	Compressor breakdown	When min-Hz is reached by current release control or when short-circuit current (Idc) is detected after direct current excitation
H02	Compressor locked	When compressor lock is detected
H03	Current detector defect	When abnormal current is detected in AC-CT or phase loss is detected
H06	Low-pressure system defect	Ps pressure sensor defect or low-pressure protective operation
L29	Other outdoor unit faults	Other outdoor unit faults: 1) Inter-MCU communication error between IPDU and CDB 2) abnormal GBT heatsink temperature
L31	Phase sequence error, etc.	When phase sequence of 3-phase power supply is incorrect (thermostat OFF operation continued), etc.
P03	Abnormal outdoor unit discharge temperature	When abnormal temperature is detected by discharge temperature release control
P04	High-pressure system defect	When high-pressure switch , IOL is activated or when abnormality is detected by high-pressure release control by TE
P22	Outdoor unit fan defect	When overcurrent or lock in outdoor unit fan drive circuit is detected
P26	Inverter Idc operation	When short-circuit protection is activated for compressor driver devices (G-Tr, IGBT)
P29	Position detection error	When compressor motor position detection error is detected

MEMO